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SYRIA AS THE GATEWAY BETWEEN EAST AND WEST

SIR LEONARD WOOLLEY

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THE SUBJECT I have chosen for my lecture to-night—Syria as the gateway between the early civilizations in the East and in the West, and the geographical conditions that made it such a gateway—may sound too common a theme to commend itself to this Society. A lecture seems scarcely called for when a glance at the map and an elementary knowledge of history are enough to confirm what is almost an axiom.

Syria indeed occupies a wonderfully central position. To the south-west lies Egypt, with a civilization going back to the fourth millennium. To the east is Mesopotamia, Egypt's coeval rival in cultural growth. To the north-east lies the land of the Amurru and the Mitanni, great off-shoots of Mesopotamia. In the north is what was once the Hittite Empire. Westwards, where Syria fronts on the Mediterranean Sea, there is Cyprus with its early Bronze Age culture, Crete with its Minoan art flourishing eighteen hundred years before Christ, and, at a later period, Greece. Syria seems ideally situated to serve as a link between all and any of all these, and history proves that the link was real and has named for us the people who were the middlemen between these ancient civilizations. Egyptian monuments are scattered freely over Syria. Syrian peoples used the cuneiform script which they borrowed from the Euphrates valley. The tomb of Rekhmere pictures Minoan vessels brought as tribute to Egypt; Middle Minoan vases occur in Twelfth Dynasty tombs; and King Khian's gold work is found in the Palace of Knossos. Homer knew of the Chalybes, the workers of iron in eastern Anatolia. Proto-Corinthian pottery derives its whole scheme and motive of ornament from Asia. Beads of Egyptian faience are found on all the Mediterranean shores, and a torque of Irish gold has been unearthed in Palestine. The facts are familiar, and surely there can be no question but that the Phoenicians were the earliest middlemen of this far-flung traffic. Salamis in Cyprus was a Phoeni-

cian town; Carthage was a Phoenician colony. Homer could talk to a Greek audience of the ivory workers of Sidon. Hiram of Tyre had his merchant navy in the Red Sea; and a Phoenician circumnavigated Africa.

The facts are there, and there is of course truth in tradition; but I would point out that the two are not always related. Some of our facts go back to very early times; yet before 1200 B.C. the Phoenicians were not an ocean-going people. If, before that date, there was traffic between East and West—and there certainly was—it did not pass through the famous ports of Tyre and Sidon. There is nothing in history to suggest that in the second millennium B.C. the Phoenician towns were the entrepôts of international trade. On the contrary, geography, economics, and politics prove that they were not designed for and did not live by such trade.

The coastline of Syria and Palestine is remarkably straight, lacking any pronounced capes or bays. Sometimes the spurs of the mountains jut out to the coast, as at Mount Carmel, at the Ladder of Tyre, at the Dog River, to the south of Tripoli, to the north of Latakia, at Jebel Akra, and at Ras Khanzir; but only Mount Carmel makes anything of a headland. Nowhere is there a really deep bay, and between those points where the cliffs drop abruptly into the sea there runs a straight or slightly incurved line of sandy beach or stepped rock ledges. Against this unprotected coast there beats the long Mediterranean swell. There are times when the sea is glassy smooth; there are other times when with reasonable care a boat can be safely beached in spite of the rollers; but for long periods at a time this is a dangerous coast. Early in this century there was an intermittent but fairly important trade at Gaza, where the hard-grained barley of the Beersheba plain was shipped to this country to make Scotch whisky. Sometimes the steamers had to lie rolling in the swell for three weeks, unable to come in close enough to take their cargo aboard; and those were steamers—no sailing-boats could have ridden at anchor off that lee shore. This swell was the ruling factor in the location of the Phoenician towns. Let us take these in order.

Tyre was an island, with a safe roadstead between it and the coast. Sidon had its rocky reef, now sunk below the sea, behind which the ships found shelter. Berytus too had a projecting reef that made harbourage possible on a small scale (Berytus was never very important). Byblos had an actual port in the creek at the mouth of its tiny river. Arvad was an island with a roadstead which served both the islanders and the people of Amathus on the mainland almost opposite. The location of the Phoenician harbour-towns was determined by purely coastal factors, not by any consideration of land routes tapping the interior. Obviously the towns had to live, and therefore each had to have a hinterland whence it could draw its food supplies. Indeed, the islands were so tiny that often the greater part of the town itself lay on the mainland. But the landed possessions of the Phoenicians were small and never extended inland beyond the mountains.

Again one must look at the map. The two mountain chains which, roughly speaking, run parallel through Syria from north to south form a very serious obstacle not only to eastward expansion by the coastal towns but also to any traffic between the interior and the coast. We experienced this in our Syrian campaign of 1942. We advanced northwards on three fronts—along the coast,

up the valley of the Beka'a between Lebanon and Anti-Lebanon, and along the desert fringe by Damascus. Our three columns could never establish contact with each other, and if one was held up the others could give it no support. It was not until the eastern column, advancing through open desert, had secured Palmyra and, by reason of the break in the mountain system behind Tripoli (through Homs and the pass of Krak des Chevaliers), had developed a wide outflanking movement threatening Beirut, that the Vichy French were driven to surrender. Very seldom is the coastal range broken by a lateral pass, and not one of the Phoenician towns is sited at the mouth of such a pass.

The configuration of the country affected the Phoenicians in three ways. In the first place they were pinned down to the coastal tract. Secondly, in the interior, the petty kingdoms into which Syria was generally divided extended north and south; for example, the Hittites held the Beka'a valley down to and beyond Kadesh, while east of the mountains the Syrian king governed from Damascus northwards. Thirdly, the main lines of trade could not pass down the coast, partly because of the lack of passes through the mountains and partly because the coast road was blocked by the spurs of the Lebanon which isolated the Phoenician towns from each other and made of each an autonomous city state: trade had to keep to the inland route.

Now the cheapest caravan route is that which passes through fewest territories, for each of these will impose payments that eat up the merchant's profit or raise unduly the price of his goods. Take this description by Harold Ingrams of trade in the Hadhramaut to-day,[1] "The goods . . . are landed on the coast of Hadhramaut, where they pay duty, and arrangements are made with the Beduin carriers to transport them to the interior by camel. Taxes may have to be paid to the chiefs through whose countries the loads must pass, if they are strong enough to demand them. . . . When the Beduins . . . come to their destination . . . it will probably be to a walled town and at the gate taxes must again be paid. . . . Thus the price of a load is often double or more its landed cost . . . and the merchant's profit must be made." In just such words did Pliny describe the cost of the frankincense route.

Caravans from Mesopotamia avoided the dangers of a desert crossing: they followed the Euphrates up to Carchemish and thence turned southwards through Aleppo and by Kadesh and Megiddo. As long as the Hittite States were on good terms with one another, the caravan tolls were reasonably few and light. Sometimes the alternative but longer route via Damascus might be cheaper, but for the rest, provided a firm control was kept over the rough tangle of the Judaean hills, trade was possible and the Syrian landbridge served its natural function as a link between the Nile and the Euphrates valleys. The importance of the unification of customs dues is shown by the story of Solomon. He inherited Damascus, which his father had taken in war. He then founded Tadmor (Palmyra), and so opened up a new Mesopotamian trade-route which, leaving the Euphrates half-way to Carchemish, by-passed the Hittite and Mitanni States. Though Solomon might exact two or three times the toll that any ruler before him had exacted, it was yet far less than the sum of the exactions of all the petty states on the longer northern route, and

[1] Harold Ingrams, "Life in ancient Hadhramaut," *Antiquity*, 19 (1945) 187–8.

the monopoly of the transit trade that he secured for the Damascus–Jisr el Banat–Jerusalem road brought him a legendary fortune.

The caravans then passed inland. Some might branch off westwards to find a local market in the Phoenician towns, but never to ship their goods from the Phoenician ports, for that would mean bad going through difficult mountains, more tolls to be paid to the Phoenician kings, and harbour dues and dock-labourers' wages; in any case, camel portage was cheaper than shipping freights. The Phoenician shippers could not compete with the Syrian land-bridge for the long-distance transit trade to Egypt. Some local traffic with the inland Syrian towns they certainly had, but the map shows how limited this must have been. The whole of Syria is no more than a narrow strip between the sea and the desert. Apart from agriculture, wool, and ivory, its towns had few resources; the staple articles of exchange between the coast and the interior were very limited. In the inland markets there were oriental goods imported from Egypt for the Phoenicians to buy; but such purchases would be consumers' goods, not intended for re-export. The trade with Syria was the result of the Phoenician towns being in existence and being wealthy enough to buy: it was not the *raison d'être* of their harbours.

Tyre and Sidon and the rest began, presumably, as fishing villages, the natural seaside settlements of immigrants from the Persian Gulf. What made them prosperous was the lumber trade. The whole mountain belt from the Palestinian border to the Caucasus was a dense forest of cedars. An insignificant local ruler like Gudea of Lagash, far away in southern Sumer, could boast of the cedar-wood which he imported from Lebanon. It was for the same cedar-wood that Sargon of Akkad marched his armies westwards until they cooled their feet in the waters of the Mediterranean. Mesopotamia and Egypt had very little timber and no hard wood, and for each of them the exploitation of the cedar forests was essential. Mesopotamia tapped the northern forests; Egypt drew on the southern forests, and her foreign policy was largely determined by her need to assure her supplies. The Mesopotamian lumber trade went by overland haulage to the Euphrates and then was floated downstream; the Egyptian trade was necessarily carried by sea, and on it the Phoenician ports grew great. There was of course subsidiary trade: all along the Syrian coast, as far north as Ugarit, heaps of crushed murex-shells show that not only at Tyre was the red purple dye produced which was so treasured by the ancient peoples of the Mediterranean. But it was the cedar forests that clothed the mountains and ran down to the sea which made Phoenicia. In these early days, the Phoenicians looked no farther afield than Egypt for their timber market, and the trade was a purely coasting one. There was no need to venture on the open sea when you could sail south and then south-west, keeping the shore in sight all the way. In Egypt the voyage ended. Egypt herself never looked westwards, and for the Sidonian shipper there was no attraction on the North African coast. To sail north-west into unknown waters would have been madness indeed. If there were savages in lands beyond sight and knowledge, they would hardly be likely to pay Egyptian prices for a cargo of cedar or to produce anything that might fetch a good price in the markets of the Delta. The early Phoenicians were no adventurers: they stuck to the business that paid and they did not venture out of home waters.

The two trade-routes then, the north–south overland route through Syria and the coasting trade in the hands of the Phoenicians, were wholly independent. But to Egypt they were complementary, and her foreign policy was largely based on this double interest. To keep the land-route open it was necessary to have control over as many as possible of the kinglets who would otherwise have taxed the caravans out of existence. That was why Egyptian garrisons were maintained in the Syrian towns and why the stronger Pharaohs were for ever anxious to push the frontiers of their empire farther north. The loot of captured cities and the tribute paid by subject kings were a strong incentive to conquest, but the long-term policy of Egyptian expansion was to command the trade-routes and to promote the flow of cheap goods in both directions. For the coastal harbours direct rule was unnecessary: the interests of the princes of Tyre and Sidon and of the Pharaoh of Egypt were alike to the extent that both profited by the trade; the Phoenicians were producers and carriers, not highwaymen profiting by the passage of alien merchandise. On the coast therefore an alliance with the local king was all that was required, and the Phoenicians could be allowed to keep their independence. If Egypt was weak and her hold on the hinterland relaxed, if there was anarchy in Syria, then rivalry between the Phoenician city states might lead to piracy, or, more simply, the Phoenicians might raise the price of timber beyond reason. The story of the Wanderings of Sinuhe [1] tells of a prince of Byblos truculently prepared to impose his own trading terms on a client too weak to drive a bargain. But generally speaking the relations between Egypt and the Phoenician kings were friendly, and even intimate. In the earliest Egyptian dynasties the rulers of Byblos took with them to their graves presents sent to them by the Pharaoh: gold-stoppered vases of obsidian bearing the royal cartouche, and such-like treasures. In the Twelfth Dynasty the Phoenician court aped that of Pharaoh, wearing the same elaborate jewellery and worshipping statues of Egyptian gods imported from the Nile valley. Tyre and Sidon, Berytus, Byblos, and Arvad were, through their commercial interests, little more than an apanage of Egypt and were content to be such. Like Egypt, they never looked westwards, and with the great inland trade routes they had little or no concern. In no sense did they form a gateway between East and West.

Now let us turn to the upper half of the Syrian coast. Northwards from Ruad there are no familiar names of Phoenician harbour towns. There are in fact few towns along this coast—a coast more inhospitable than that of the south, where the mountains for the most part crowd down to the sea and drop in cliffs against which the surf beats as soon as any wind arises or push out rocky ledges that would tear the bottom out of any boat that ventured close to the shore. The mountains of the Amanus range are wilder and more difficult than the mountains of Lebanon, and like the Lebanon were clothed with cedar forests. These indeed were a source of wealth, but they were exploited by rough wood-cutters, their sole inhabitants, and the narrow valleys allowed no cultivation such as would support a town. There is, in fact, no single "tell," no ruin of any sort, recorded in the whole mountain range.

In the gulf of Iskanderun, the Amanus fall back in a bold sweep that leaves an arc of more or less flat and fertile ground between Ras el Khanzir, at the

[1] J. H. Breasted, 'Ancient records of Egypt,' vol. I, pp. 486–97.

south extremity of the gulf, and the Issus gates. At the south end of the arc is a big "tell," its surface littered with late Roman remains, which is probably the site of Arsus, a very ancient city. It lies under the lee of the Ras el Khanzir, and is the best sheltered spot in the whole gulf, which is itself sheltered in most weathers and affords a safe riding for ships at anchor. The site commands the fertile land whose harvests could support a town population. Through the Issus Gates, a track along the beach where the railway runs today gives access to the Cilician plain of southern Anatolia. Eastwards the Bailan pass—none too easy a pass, but a pass none the less—through mountains which are for the most part impracticable, leads to the Amk plain and so to the Aleppo plateau and the middle Euphrates.

Farther south, between the Jebel Akra and the spur on which Seleucia was one day to be built, stretches the shallow bay of Sueideia through which the Orontes winds to the sea. Here again there is room enough for cultivation; here again a pass—the Antioch pass—leads to the Amk plain; and here too, on the banks of the river whose mouth formed a sheltered harbour for the little ships of antiquity, there was a trading port—the port of Al Mina.

Farther south again, where the mountains break down into rolling hills behind Latakia and one can travel westwards at pleasure from the rich mountain plain to the middle Orontes and the great overland trade-route between Aleppo and Hamath, there is a little sandy cove called the White Harbour, λευκός ὅρμος, Minet el Beida. It is moderately well protected, the swell is less heavy here than in the south, and it is easy to beach a ship on the gently sloping, firm sands. Here there was a port, Leukos Hormos, and a mile or so inland was the town of Ugarit.

Here then were three harbour towns; and at once one sees how very different they were from those of Phoenicia. They did not serve the timber trade, because that went eastwards, overland, to the country of the Two Rivers. All three lie at the entrance of passes leading to the interior, and their sites must have been dictated by the interests of trade, for there were no other passes through the mountains and no other seaport towns: where there was no pass men saw no inducement for settling by the sea. The trade which these ports served was not a local one. The coast produced little except fish, and had these been mere fishing villages which carried their catch for sale to the inland towns they would have remained villages; but Ugarit and Arsus at least grew to be rich and important cities. Clearly therefore they were not the termini of the trade-routes through the mountains. Geography alone is enough to prove that they were the harbours of an export and import trade between the inland towns and markets overseas.

Now we may turn from the map, which has shown us this much, to the results of excavation. Arsus has not yet been touched by the archaeologist, so we can say no more about it. At Al Mina, at the mouth of the Orontes, erosion of the river bank has destroyed all early evidence that may have existed and the tale of the place can be taken up only at a much later date. But inland, beyond the Antioch pass, we have dug part of Tel Atchana, the ancient Alalah, capital of a petty kingdom which straddled the exit of the pass so that whatever merchandise came in from overseas or was brought from the manufacturing centres of the north and east for export abroad passed through its

34°
36°
38°
Cilician Plain
Carchemish
Arsus
Antioch
Alalah
Al Mina
J. Akra
Aleppo
36°
Euphrates
Ugarit
Latakia
Orontes
Salamis
Hamath
SYRIA
Arvad
Amathus
Krak des Chevaliers
Homs
CYPRUS
Tripoli
Kadesh
Palmyra
Byblos
Lebanon
Al Bekaa
Anti-Lebanon
34°
Berytus
(Beirut)
Sidon
Damascus
Tyre
Haifa
Mt. Carmel
Megiddo
Jisr el Banat
PALESTINE
Judea
32°
Jerusalem
Gaza
Beersheba
Pelusium
Miles
50 0 50 100
34°
36°
Gulf of Iskanderun
Issus Gates
Amanus
Bailan Pass
Amk Plain
Arsus
Ras el Khanzir
Alalah
Antioch
Seleucia
Al Mina
(Posideium)
Suvideia
J. Akra
(Mt. Kasios)
R. Orontes
Miles
5 0 5 10 15 20

Ladder of Tyre

Phot. J. W. Crowfoot

In the Lebanon north of Dog river

territories. A typical North Syrian city, vassal state of the King of Aleppo, Alalah was open to all the markets of that world in which Sumer and Babylonia, Assyria, Amurru, Mitanni, and the Hittite states played their part; it could also reap the first fruits of trade with the West, taking its pick of the goods brought in from the Mediterranean markets. It tells us therefore as much as the port of entry could have told.

At Ugarit and at its harbour, Leukos Hormos, Dr. Schaeffer's discoveries have thrown a flood of light upon the problems of North Syria. Ugarit was on the border of the debatable land between the sphere of influence of Egypt and that of the Mesopotamian powers or of the Hittites. It was at times in alliance with, and at one time at least, subject to Egypt. But it was a North Syrian, not a Phoenician city. Its inhabitants were akin to those of the Jezireh and their culture was North Syrian overlaid with Mesopotamian. Whatever its temporary political allegiance, its economic horizon remained the same.

The earliest trans-Mediterranean contact of which archaeology has given evidence was between Crete and Egypt. The resemblance between early Cretan stone vases and those of First Dynasty Egypt is so striking that Sir Arthur Evans postulated an Egyptian settlement in the island at that early date.[1] He supposed that in the troubled time which led to the establishment of the First Dynasty, a band of malcontents, driven out of their own country, found refuge in Crete; if that was so, they came in Egyptian ships. But this is no proof of regular intercourse—indeed, all the archaeological evidence is against such a supposition. Panic can drive men in strange directions and to unknown goals. This exodus from Egypt was an isolated thing, a blind adventure; the settlers remained in their place of refuge and Egypt did not know what became of them. No Egyptian ships made a second voyage to Crete.

Legend says that Sargon of Akkad, having reached the shores of the Mediterranean, went yet farther: he took ship and conquered Cyprus. That may or may not be true, but the mere fact that the story could find credence is illuminating. Sargon had no sailors in his train, no ships, and no crews other than those he could find upon the North Syrian coast. The story of the Cyprus raid implies that the ships and crews were there and that the voyage to Cyprus was familiar to them. Neither at Ugarit nor at Alalah does the archaeological evidence as yet go back so far as the time of Sargon, the twenty-fifth century B.C. The earliest strata we have tapped so far belong to about the twentieth century, but what they show is certainly not inconsistent with the Sargonid legend.

At this time, the powerful Twelfth Dynasty of Egypt had extended its sphere of influence into Northern Syria. Ugarit was under Egyptian domination, as is proved by the finding of statues of Sesostris I and Amenemnes III and memorials to Egyptian officials who held governmental posts in the city. Alalah, if not in Egyptian hands, was at least in alliance with Egypt, for one of its royal house is represented as worshipping an Egyptian god.

At Ugarit, in the Twelfth Dynasty level, there have been found sherds of painted pottery of the unmistakable Middle Minoan ware of Crete; and, in the same and succeeding levels, some of the locally made wares are imitations

[1] Sir Arthur Evans, 'The palace of Minos,' vol. I, p. 17.

of the Cretan. Dr. Schaeffer interprets this as meaning that "Cretan merchants had set up their offices in Ugarit." [1] Even if that be not so, the pottery is imported and proves that commercial relations had been established between Crete and the Syrian coast town.

The same Middle Minoan pottery has been found in Twelfth Dynasty graves in Egypt. In view of the control exercised by the Pharaohs of that time over Ugarit, it is possible that those vessels were brought to Ugarit in the normal course of trade and thence carried down into Egypt either by land or by sea; if by sea, then the ships of Leukos Hormos were the carriers. But even if that were so, it does not prove who brought the Cretan pots to Ugarit, and it is at least as likely that the pots found in Egypt never passed through Ugarit at all, but went there directly from the island. According to Thucydides, the Minoan empire was the first thalassocracy. It is true that in the Twelfth Dynasty the great age of Knossos (the real Minoan age) was yet to come, but the seamen who built up the thalassocracy a few centuries later must have come of a line of seafarers, and we may well believe, with Dr. Schaeffer, that the Middle Minoan potsherds which he found bear witness to a trade initiated by Cretan sailors and carried on by Cretan merchants actually settled in Ugarit. There they no doubt learned of the rich market awaiting them in the south, and so shipped chance cargoes of their gaily painted egg-shell pottery, either down the Syrian coast or possibly on the straight run from Crete to the mouths of the Nile.

Alalah has given us no examples of Middle Minoan vases. But if we pass on to the next period, the early part of the eighteenth century B.C. (corresponding to the Hyksos period in Egypt and the age of Hammurabi of Babylon), then we have proof of Cretan connections of a very different sort. In the palace of Yarim-Lim, King of Alalah in about 1780 B.C., there are features which parallel those of the palace of Knossos in the Late Minoan period. The Syrian palace of this date, like its successor of the fifteenth century, was built of half-timber and brick set upon large orthostats of polished stone. In it there was an upper room, the *piano nobile*, lit by a window with a stone frame and a central column like those on the mosaics of Knossos. The room itself, like other important rooms in the palace, was divided into two parts by a pair of columns set between two wall pilasters and standing on a low threshold—a typically Cretan design. Its walls were decorated with frescoes which, in their peculiar technique, reproduced the "miniature" frescoes of the Cretan palace. Here we have to do not with stray pottery vessels, easily transportable and proving no more than a possible casual contact, but with architectural styles and decoration whose interchange bespeaks a much closer intercourse. And Yarim-Lim's palace is not a copy of the Cretan, for it antedates it by as much as two hundred years. Between 2000 and 1800 B.C. there was a development of Cretan art which amounts almost to a revolution. Are we then to suppose that such development was due not only to local genius but also to new influences brought from foreign countries? There is no Egyptian influence in the Cretan frescoes or the Cretan building styles. Since these have an earlier parallel in North Syria, does it not mean that free trade with the Asiatic main-

[1] Claude F. A. Schaeffer, 'The cuneiform texts of Ras Shamra Ugarit,' p. 12. Schweich Lectures, 1936.

land through the North Syrian ports was one of the formative influences of Cretan art?

One very fine object of Cretan art has been found at Alalah—a carved lamp of red porphyry in the best "Palace" style—but its date is uncertain. Perhaps the very rarity of imported objects may be taken in favour of the view that in this period, the eighteenth century B.C., the East was influencing the West rather than vice versa. In the next phase, the seventeenth century, there is little evidence as yet of Minoan exports to Syria, but plenty to show Syrian contacts with another part of the Mediterranean. The pottery familiar to us as that of the Bronze Age in Cyprus begins to be found at Alalah at a date probably just before 1700 B.C. As time goes on it becomes more and more common until by the fifteenth century it is the normal table-ware alike of the palace and the private house. This pottery—the "milk-bowl" with a white surface and simple structural ornament in black or brown, derived from a bowl of stitched leather, the brown slip-ware jugs, and the zoomorphic vessels of grey ware with details in white paint—has long been considered a peculiarly Cypriote fabric. Certainly it was manufactured in the island and was the ware most in use there. But, if Cypriote chronology is to be trusted, this characteristic pottery occurs at Alalah long before it occurs in Cyprus. In Cyprus it appears suddenly, having no antecedents in any local ware, whereas at Alalah there is some evidence for its development from earlier types. Again it would seem that a Mediterranean culture is indebted for its development to Syria and to the trade passing through the North Syrian ports.

Of course the traffic went both ways. Ugarit in the fourteenth century was almost a Late Minoan III colony. Its defences recall those of Tiryns and Mycenae. The tombs of its rich merchants—subterranean chambers with stepped dromos and corbel-vaulted rooves—are like the Mycenaean tomb at Isopata in Crete, and Mycenaean and Cypriote pottery is regularly found in tombs and houses.

During this period Mycenaean pottery is common in Egypt and Egyptian reliefs portray the bringing of tribute in the form of Mycenaean vessels to the court of Pharaoh. It is of course quite possible that these things came to the Delta ports direct from Crete: the Minoan thalassocracy was at its height, and the Minoan seaman had none of that fear of the open sea which kept the Phoenician hugging a friendly coast. It has even been conjectured that the sunken harbour quays beyond the Pharos island off Alexandria were those of a Cretan trading station, kept at arm's length from Egyptian soil by the Egyptian hatred of intruding foreigners. On the other hand, the strong Pharaohs of the Eighteenth Dynasty had extended their conquests far into the north of Syria, and Ugarit was definitely under their control. Egypt's Mycenaean imports may well have come through this gateway. Dr. Schaeffer has suggested that the Keftiu, who are portrayed on the Egyptian monuments as bringing their Mycenaean tribute to Pharaoh, were not island Cretans but the Mycenaean colonists of the Syrian harbour town.[1] Indeed, it is difficult to see why the islanders should become tributary, whereas Ugarit would normally send its yearly present to its overlord, and that present would naturally take the form of the Mediterranean works of art which were the special pride of its merchant

[1] *Ibid.*, p. 21.

aristocracy. If Dr. Schaeffer's identification is correct, then Ugarit was the channel through which flowed the trade between Egypt and Crete.

Meanwhile, Alalah, farther north, was otherwise orientated. Egyptian control broke down after the death of Thutmosis III, and the Mitanni of northern Jezireh became the city's overlords. Then, about 1370, Suppiluliu the Hittite conquered Mitanni and Alalah had to acknowledge a Hittite master. Sculptures of this period show how thoroughly Hittite art was assimilated. The pottery most characteristic of the period is what is called the "Nuzu" ware, a ware found as far east as Kirkuk and apparently a Mitanni fabric. At Alalah the decoration of this pottery sometimes takes a form absolutely unknown in the eastern centres, and is astonishingly reminiscent of Minoan art. Side by side with it are found both imported Mycenaean works and the so-called "Cypriote" fabrics which, as we have seen, were Cypriote in style but Asiatic in origin. But there is no sign of an actual Mycenaean settlement at Alalah and the Egyptian influence in art is small: Alalah belongs to the northern orbit.

Just after 1200, disaster came with the invasion of the Peoples of the Sea. Alalah and Ugarit were both destroyed. One result of that great migration of northern peoples is familiar to us, namely, the settlement of the Philistines in southern Palestine. Another seems to have been the settlement of a people of Mycenaean stock on the Phoenician coast. They came by sea and they brought with them all the traditions of a great sea power. This new element in the population revolutionized the ideas of the old Semitic towns.[1] The coastal traders became merchant adventurers: they sailed westwards and founded Carthage; they settled in Sicily; they opened a trading-port at Marseilles; and they colonized Cartagena in Spain. Only now, after the fall of Troy, did the Phoenicians adopt the rôle of international freighters for which they were to be remembered.

But the usefulness to world trade, even of these latter-day Phoenicians, had its limits. They were in close touch with Egypt and they maintained friendly relations with the ruling princes of Palestine and southern Syria. But while Egypt, by conquest or by alliance, kept a somewhat precarious hold over South Syria, North Syria was under the vassalage of Urartu and later of Assyria, or was enjoying a semi-independence under the Syro-Hittite kings whose dominions stretched from Carchemish to Hamath. These last might flirt with Pharaoh when threatened by Assyria, but for the greater part of the time the trade-routes between North and South Syria were closed by the hostility between the northern and eastern states and Egypt. After 900 B.C. a certain amount of trade came from Mesopotamia by the Palmyra route, but even that was frequently hampered by the wars between Damascus and one or other of the Jewish kingdoms. From the land of Urartu and from Assyria very little merchandise can have found its way through the Phoenician ports.

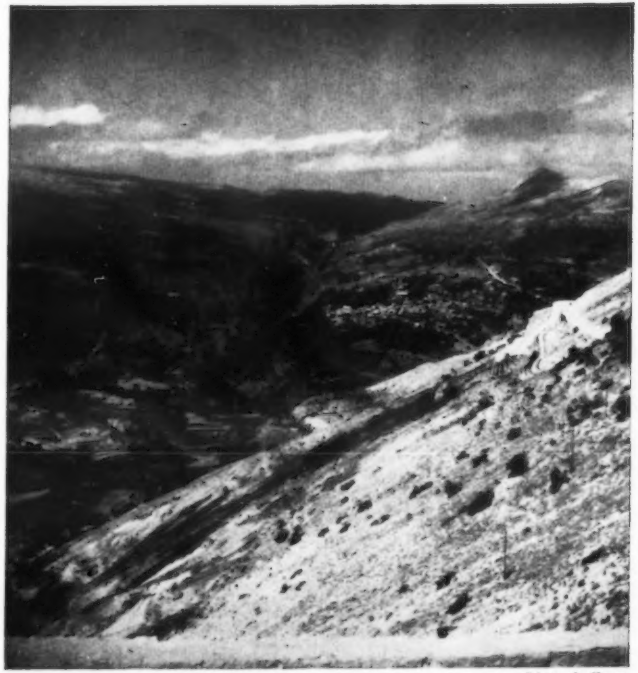
There was one Mediterranean area in which the Phoenicians did not enjoy a monopoly of the freight trade for long. They established a "factory" at Salamis in Cyprus; but though they began to trade with the Greek islands and the Greek mainland, the Greeks, themselves seafarers, were prepared to start a rival line. Naturally the Phoenicians would not give their competitors a footing on the Phoenician coast; no less naturally the Greeks would have every advantage in opening up a new route that would enable them to tap markets

[1] Leonard Woolley, "La Phénicie et les peuples Égeens," *Syria* 2 (1921) 177–94.

Jebel Akra and the site of Al Mina

Phot. Claude F. A. Schaeffer

Minet el Beida



Phot. A. Costa

Valley of the Kadisha in the Lebanon above Tripoli

Phot. A. Costa

Castle and pass of Krak des Chevaliers

closed to the southern ports. Perforce they too had to chose a site secured against their Phoenician rivals. Ugarit never recovered from its destruction by the Peoples of the Sea. Alalah never recovered either, and its site lay desolate. But other towns in the populous Amk plain were flourishing, and a new town with a new palace was to rise within a mile of Alalah. What the Greeks desired was a port that served the Amk plain. Whether or not Arsus was then active we do not yet know, but we do know that at Al Mina, at the mouth of the Orontes, cut off from the main Syrian coast by the promontory of Mount Kasios, there was developed a trading-station which, as the port of Posideïum, was for centuries to be the link between Greece and Asia.

Archaeological evidence for the trading-station takes us no further back than the eighth century B.C.; if it existed earlier than that, the evidence for it has disappeared with the erosion of the Orontes bank. A site just inland however has yielded Cypriote and late Mycenaean sherds of the twelfth century. Herodotus says that Posideïum was founded by Amphilochos of Argos, a hero of the war of the Seven against Thebes,[1] and John Malalas records a legend which tells of a Greek hero, Kasos (the eponym of Mount Kasios), who founded a coastal settlement in the Antioch region and peopled it with Cretans and Cypriotes and, having married a local princess, Amyke (the lady of the Amk), ruled as king.[2]

If we accept the literary evidence, the port was founded shortly after the fall of Troy, not by the Syrians but by the Greeks from overseas. Certainly by the early eighth century it was a flourishing market. All the pottery is of the sub-geometric type from the Cycladic islands. In the late eighth and seventh centuries a large proportion of the pottery is Cypriote in type, but the Cycladic continues side by side with it. In the seventh century Rhodes is taking part in the trade, then Corinth, then Lesbos and Chios.

In the eighth century North Syria was dominated by the Kingdom of Urartu, so that the new port was in touch with the metal-working industry of Lake Van. This explains an oriental element in early Greek art which had hitherto been unaccountable: "the trade route from Armenia to Crete," writes Dr. Sidney Smith, "must have passed through Al Mina." [3] In 740 B.C. Assyria became mistress of North Syria but Posideïum carried on its business undisturbed, only, one may suppose, extending its markets eastwards. Then, in the sixth century, there comes a gap. The buildings were destroyed, the harbour apparently deserted. Nebuchadnezzar had conquered the whole of Syria down to the south of Palestine. He organized the traffic of the Phoenician ports, but he did away with the Greek port in the north, possibly because the Phoenicians, as his subjects, could be easily supervised and the alien Greeks could not. Perhaps the Phoenicians prompted the extermination of their rivals. If the Greeks wanted to trade with Persia they had to do so through controlled areas. Some Greeks did, as we know, for in time Attic black-figured vases begin to occur in Syria. But they must have longed for a chance to run their own trade independently. The chance came about 520 B.C. in the reign of Darius I of Persia. Then Posideïum made a fresh start, but when it did so the trade which filled its warehouses was a monopoly of Athens. All the

[1] Herodotus, vol. III, p. 91.

[2] John Malalas, 'Chronographia' (ed. Dindorf), vol. VIII, p. 257.

[3] Sidney Smith, "The Greek trade at Al Mina," *Antiquaries J.* 22 (1942) 87–112.

pottery is Attic. The retail business of the place was carried on, as one would expect, in the small Persian coinage struck mostly in Phoenician mints; but the larger coinage for wholesale trade took the form of Attic tetradrachms or local imitations of Attic tetradrachms. All through the long-drawn struggle of the Persian wars, when Athens was fighting for freedom and for life against the tyranny of the house of Xerxes, Athenian merchants were carrying on business as usual with the Persian Empire through Al Mina.

The end came in 312 B.C., when Ptolemy I of Egypt destroyed Posideïum. But the result proved the importance of the northern route, for instead of repairing the little riverside port, the Seleucids built, a few miles to the north, one of the biggest and most expensive harbours of the ancient world. Seleucia, with its great artificial basin, proof against any wind or sea, was a worthy channel for the luxury trade of Antioch. It showed too how indispensible it was that there should be a gateway here between the Mediterranean world and that north corner of Syria which, from the beginnings of history, was the meeting place of so many Asiatic empires.

DISCUSSION

Before the paper the PRESIDENT (The Rt. Hon. LORD RENNELL OF RODD) said: This evening we have been lucky enough to persuade Sir Leonard Woolley to deliver the Asia Lecture. The last Asia Lecture given to this Society was in 1943, when Mr. Evert Barger read a paper on "Some problems of central Asian exploration." You will recollect that the Asia Lectures, which are the Dixon Foundation of this Society, were inaugurated in 1924 with a lecture by Sir Aurel Stein. It is most appropriate that Sir Leonard Woolley, who has done so much work in the Middle East and in the Levant, should deliver the first Asia Lecture in the post-war period.

Sir Leonard Woolley needs no introduction to this audience. Either you have already heard him lecture before this Society or you already know of the work he has done in the field of archaeology in the last twenty-five years in establishing that bridge between the civilizations of the Mediterranean and the Middle East about which he is going to speak to-night.

We are happy to have here as our guest His Excellency the Turkish Ambassador, who, with his Government, has contributed so greatly to making archaeological research in his country possible.

Sir Leonard Woolley is leaving England again to resume his work, and we are happy to have him here on the eve of his departure. He has contributed more than most others to preserving for our civilization the monuments of North Africa, Italy, and Northern Europe and to protecting them from the stress and damage of war. Our thanks, if for no other reason, are due to him for his work in that connection.

Sir Leonard Woolley then delivered the lecture printed above.

The PRESIDENT: There is little that a layman like myself can add, except to voice your thanks and mine to Sir Leonard Woolley. What he has told us to-night of the traffic east and west across the bridge of Northern Syria is a typical example of his work, not only as an archaeologist but also as an historian who has derived his information from his own research. I do not think there is any higher praise of an archaeologist than to say that he is first an historian. Sir Leonard does not dig for the sake of digging but for the lessons that can be learned and passed on. I ask you to join with me in thanking Sir Leonard Woolley for his lecture this evening.

POPULATION TRENDS AND THE WORLD'S RESOURCES

G. C. L. BERTRAM

Afternoon Meeting of the Society, 18 March 1946

MY INTENTION THIS afternoon is to present a broad picture of the relationship of man's numbers and needs with the availability of biological resources, in the form of food and industrial raw materials, both now and in the near future. I have no new facts to present, but hope that an arrangement of known facts alongside one another will be helpful in providing an appreciation of how we stand. I refer especially to the British Empire and Commonwealth because it contains such diverse lands, peoples, and conditions, and because its welfare is our special concern.

Needs, determined by population, are met over a wide field by biological resources. The supply of these biological resources is dependent upon a whole host of factors, some of them favourable, some of them unfavourable. Some of these factors are constant, some of them dynamic in their incidence; some are under our control and some are not. Frequently factors on the biological plane are both accelerative in action and accumulative in result. Many of the factors concerned lie in the zone of overlap between geography and biology. This afternoon I shall deliberately leave aside the problems set by our economic system, in which individual and national need and purchasing power so often seem almost to be in inverse ratio.

Biological resources derive from the present growth and reproduction of living organisms, both vegetable and animal. It is axiomatic that for all supplies derived from living organisms there is a particular annual cropping rate which will give the maximum harvest on a sustained yield basis. This is the rational rate of cropping, and departure from it in either direction results, over a period of years, in reduced yields. This principle is of primary importance whether we are considering fishing, grazing, lumbering, or the fertility of the soil itself. Area is the most important single factor in production, and the total area available obviously has an upper limit.

The biological resources with which we are concerned supply the whole of our food (with such minor exceptions as salt and saccharine) and a large part of our industrial raw materials. Usually food and industrial crops are in competition for the same areas of land. For the most part this competition will continue to be inevitable. Sometimes the calls of food and industry compete for the same commodity; for example, fats and vegetable oils. I shall not deliberately lay more stress on either of these two categories, the dietary and the industrial. But in the first part of my argument I shall deal chiefly with the dietary aspect of supply. This is because there is now a moderately well-agreed level of nutrition which is deemed necessary for the individual. There is no similarly agreed level of supply of rubber, timber, fibres, paper, soap, and so on.

The present shortages of food on a world-wide scale have shocked us all. But the shock has been greatest for those, and they were many, who previously had not realized the possibility of widespread famine in our days. The present and immediate task is obvious: by all means famine must be alleviated. With careful distribution of what we have, the starvation of multitudes may perhaps be avoided or minimized. That will seem a major victory. But the avoidance of actual starvation is very far from being enough. We have begun to realize in recent years just how large is the gap between a diet sufficient to maintain life and one adequate for full health and vigour. Here it is worth noting one respect in which our species seem to differ from most other animals, certainly most mammals and birds: on a badly deficient diet, humans continue to reproduce at a rate which is only slightly reduced. This is a point of leading importance in world affairs, and is of special significance in the story I wish to set out for you this afternoon.

Our consciousness of the need for an adequate diet, and of the existence of widespread malnutrition in times called normal, has been stimulated in recent years. Interest and effort have awakened. Surveys in the United Kingdom in the inter-war years showed that even among our own people a substantial proportion were living on a diet inadequate in quantity or content. Yet the standard of living here was amongst the highest in the world. Comparable surveys were made in many lands with similar results. These conclusions were all brought forward as meat for digestion at Hot Springs in 1943. As a result we had P.O.F.A. (the Provisional Organization for Food and Agriculture), which gave birth to U.N.F.A.O. (the United Nations Food and Agricultural Organization). More recently, in November 1945, a great conference on world nutritional problems was held at Quebec.

I will remind you of some passages from the Report of the Hot Springs Conference:

> "There has never been enough food for the health of all people. This is justified neither by ignorance nor by the harshness of nature. Production of food must be greatly expanded; we now have knowledge of the means by which this can be done. It requires imagination and firm will on the part of each government and people to make use of that knowledge." [1]
>
> "In the U.S.A. and Western Europe much malnutrition exists among the lower income groups. Available data suggest a figure of between 20 per cent. and 30 per cent. of the entire population. In the British Dominions, although food consumption is relatively high, malnutrition is not uncommon, especially among children. In Central and Eastern Europe malnutrition prevails extensively and there is often a lack of the staple foods as well."
>
> "The diets of the great mass of the population in the East are grossly deficient in terms of any standard of adequacy put forward by nutrition workers. Some 75 per cent. of the 1150 million inhabitants in Asia have a diet far below the standard for health." [2]

[1] From "Declaration" in Final Act and Section Reports of Hot Springs Conference.
[2] From Report of Mixed Committee on Nutrition, 1937, quoted in Introduction to Section I of Hot Springs Report, 1943.

It is evident that a very large proportion of the 2000 million people of the world, even in "normal" times, exist on an inadequate diet. The present famine, or near famine, conditions in large areas of the world are not something novel, but simply an intensification of the pre-existing lack of adjustment between supplies and numbers, between meat and mouths, between availability and need.

This brings us to the fundamental problem of what is an adequate diet. It is not for me here to suggest an answer on a dietary or clinical basis. It is enough to state our objective: that every individual born into the world shall have a diet, and a standard of material well-being, which will enable him to develop to the full all the capacities with which he is endowed.

On a world scale there has never yet been true adequacy of biological resources. But, you may ask, were there not gluts in the inter-war decades, gluts of wheat, cocoa, rubber, wool, and of other commodities? That is true. Locally there have been gluts and limitations of production. But these phenomena have been indicative, not of supplies being adequate to meet the total human need, but of lack of purchasing power and organization. There is far from true world sufficiency of any biologically produced material, whether for food or industry, if we hold total need as our criterion. The gap between need and supply or availability is immense, though largely unmeasured.

Our international conscience has developed in recent years. Until lately, in times of shortage, those lands with purchasing power bought and fed their people while others starved, often unnoticed and unnumbered. Now, in this present time of world food crisis, the richer lands again buy and feed their people. But they deliberately buy less and distribute more skilfully, so that fewer will starve than formerly would have been the case. Most of those who starve now will probably be, as usual, in East and South-East Asia, though Central Europe may provide an abnormal number. I would remind you, in this connection, that the cereals which enter world trade are a small fraction of the whole. When we are told that the present world shortage of wheat and of rice is so many million tons, that is a shortage in transported cereals. The real deficit is not known. Remember, too, how narrow is the distinction between virtuous thrift and avaricious hoarding. If 100 million of India's small cultivators, when famine is rumoured, retain each so little as an extra 10 kilograms of grain, the towns will be short of a million tons.

This problem of inadequacy is of especial significance within the British Commonwealth and Empire, a sample of the whole world which contains abnormally great inter-territorial goodwill. Here, in the Mother Country, some forty-five millions of us import about half our total sustenance. Highly industrialized, we support a high standard of living. The young and vigorous Dominions overseas, totalling less than twenty-five millions of European origin, have an equally high standard of living but are among the world's greatest food-exporting countries. The near-Dominion of India, with its 400 millions, imports only a fraction of its food and has an extremely low average standard of living. The Colonies, so diverse in their evolution, character, people, and appearance, are scattered along the path which has India and Canada at its two extremes. The United Kingdom imports the largest quantity

of food of any country in the world. India, with nearly ten times our population and one-fifth of the world's total, imports relatively little to meet her immense and swelling need.

Are we, in the Empire, playing our full share in helping each other, and the rest of the world, towards that real sufficiency which we must believe desirable? We know that in fact we are not producing enough now. But are our lands potentially capable of producing enough to meet present and future needs, and if capable, how soon? In the Crown Colonies, is the Colonial Development Fund demonstrably a sufficient spur and stimulus to increased production and development? To all such questions we must, I fear, answer, "We do not know." The reason lies partly in our inability to view the background to these questions as an integrated and dynamic whole. So far we have largely neglected to measure and to equate real need and supply, and to assess potential need and potential supply. Our thoughts, and then our policies and actions, need to be more squarely set upon an appreciation of the whole background and its measurable parts, rather than upon selected factors and trends which emerge from the background and are seized upon by highly competent enthusiasts. Indeed the enthusiasm of the specialists perhaps limits the appreciation of the background as a whole. In presenting the background one is facing the same type of problem as besets the map-maker in his attempt to set down on two-dimensional paper the three dimensions of the globe. One needs to integrate, first, changes of real need as measured by changes in human numbers and standards; secondly, a group of factors helpful in increasing supplies, for example the cultivation of new lands, irrigation works, the use of new crop varieties and cultivation practices; and, thirdly, a host of factors tending to diminish supplies, including land degradation and irrational exploitation. This background in its entirety must surely be the basis of policy.

First, what in our days is happening to the total population of our species? This is the central factor which measures our total needs in food, organic matter for other purposes, and much else besides. It may be said at once that we live in days of unprecedented increase of population, and therefore of unprecedented increase of real needs. We have now become aware that the majority of mankind has legitimate requirements in food and other organic matter far beyond the level which supplies have yet reached. It follows, if we are to approach the adequacy we know to be desirable, that the rate of production of biological resources must increase much faster than this unprecedented increase in our numbers. It is the relative rates of increase of population and supply which are of leading importance.

There is a remarkable lack of appreciation of the great increases which are taking place in the numbers of our own species, and indeed of population affairs in general. The usual assumption is that, because we reproduce so much more slowly than our domestic animals, and the length of each generation is so long, our own numbers cannot increase rapidly. This assumption is false. Mankind takes such peculiar care of its relatively few young that actual increases in man's numbers can be rapid, though not approaching the extreme rapidity of increase which sometimes is observed among other species under special conditions. In these islands we have increased our numbers approxi-

mately eight-fold in the dozen generations since the middle of the seventeenth century. In the four generations of the nineteenth century we quadrupled our population, and this despite heavy emigration.

Let us compare our own past reproduction with world figures. These cannot of course be strictly accurate because census-taking is a comparatively recent innovation. Carr-Saunders, among others, has assessed the evidence available and provides the following table, which surely cannot be very far from the truth.

Revised estimate of the population of the world 1650–1933 [1]

(*millions*)

Continent	1650	1750	1800	1850	1900	1933
Europe	100	140	187	266	401	519
North America ..	1	1·3	5·7	26	81	137
Central and South America ..	12	11·1	18·9	33	63	125
Oceania	2	2	2	2	6	10
Africa	100	95	90	95	120	145
Asia	330	479	602	749	937	1121
World total ..	545	728	906	1171	1608	2057

It will be seen that world population has increased roughly four-fold during the three hundred years in which our own population has multiplied more than eight times. Carr-Saunders points out that this modern trend towards much increased numbers must be unprecedented in human history. It follows that we live in a time when total human needs, and total human pressure on the biological resources of the world, are rising at an unprecedented rate. This pressure is made all the greater because, in the last few decades, world opinion has begun to recognize that human needs should be met by adequacy for full individual development, and not only by sufficiency for survival and reproduction. At the present time it is doubtful whether we are in a position to provide, on a world basis, even enough for the survival of many. The biological budget, of numbers, needs, and production, for the coming decades requires all the more serious consideration.

The present unprecedented increase in human numbers is, of course, not a process which is going on equally all over the world. A glimpse at its causes will at once go far to explain its present relative incidence. In general, the four-fold increase of world population in the last three hundred years has been the result of decreased mortality—a decline in the death-rate and not an increase in reproduction. Carr-Saunders points out that the cause of this decrease of mortality "may be classified into four groups, though the boundaries between them are indefinite and though there is much overlapping: (1) *political*, that is conditions relating to the maintenance of external and internal order; (2) *social*, including the state of knowledge in relation to the production and the use of food, and to the making and use of clothing; (3) *sanitary*, that is conditions relating to housing, drainage, and water-supply;

[1] A. M. Carr-Saunders, 'World population,' Fig. 8, p. 42. Oxford, 1936.

(4) *medical*, including both the state of knowledge concerning the prevention and cure of disease and its application to the public at large." [1]

Carr-Saunders goes on to say,[2] "The evidence for India points to a large increase of population from the later part of the eighteenth century onwards, that is to say, from the time when the British succeeded in pacifying the country and eliminating civil disturbances. So too in Java, where warfare was chronic until the Dutch gained control, the rise of population first became evident after the Dutch occupation had become effective. In Egypt the increase of population dates from the time when Mehemet Ali established his power. In none of these countries is there any evidence that the death-rate has yet been affected by factors under headings (2), (3), and (4). In support of this statement it may be mentioned that, so far as can be ascertained, the expectation of life in India has not increased since about 1890." He emphasizes that "the cause of this increase was the reduction of the death-rate owing to the establishment by Europeans of order and security in these countries. It is sometimes supposed that the reason was the introduction by Europeans of sanitation and medicine. But these agencies have hardly begun to affect the lives of non-European peoples. When they do so, their death-rates, which are now . . . more or less steady, will decline." [3]

Because we value the individual human life and are philanthropic in sentiment and in action, we must expect an extension of the process of removing causes of mortality. Therefore we must expect, and budget for, substantial further increases of world population in the coming decades. That is inevitable, unless the former causes of mortality are to be allowed to re-assert themselves or unless we assume, as we have no right to do, that fertility will fall rapidly.

But surely, you may ask, as the standard of living of the peoples in the world rises, will not their net reproduction rates, their replacement rates, fall as it has done in our own land, in north-west Europe, in the Dominions, in the United States of America, and in most groups of European origin overseas? Did not Mr. Churchill in his broadcast on 21 March 1943 say: "One of the most sombre anxieties which besets those who look thirty or fifty years ahead is the dwindling birth-rate. If this country (the United Kingdom) is to keep its high place in the world and to survive as a Great Power that can hold its own against external pressures, our people must be encouraged by every means to have larger families." We now have a Royal Commission investigating our ageing population. "If fertility and mortality remain in Western Europe and Northern Europe what they were in 1933, the population which is now about 194 millions will by the year 2000 be reduced to about 150 millions." [4] In particular it is the English-speaking peoples, including the U.S.A., who now have a replacement rate which has fallen to below unity. The only substantial sections of the white population of the British Commonwealth and Empire which still replace themselves are the French Canadians, the Irish, and the Afrikanders—about ten millions in all.

But these groups with a replacement rate near unity or below are not typical

[1] Carr-Saunders, *ibid.*, p. 75.
[2] *Ibid.*, p. 82.
[3] *Ibid.*, p. 83.
[4] Robert R. Kuczynski, 'The population problem,' p. 116. London, 1938.

of the world as a whole. We have no good grounds for expecting that certain other populations of the world, now largely increasing in numbers, will shortly reach the condition of our own. Their fall in replacement rate may come, but it is likely to take several decades if not generations. If we are successful in our efforts to promote the well-being of all peoples, we must expect that for a while there will be an increased rapidity of population growth on the world scale. This will correspond, as it were, with our own period of greatest population increase during the nineteenth century, which was also the period in our history of most rapid increase in standards of living. Russia would appear to be now in that stage. Her present population of about 190 million will almost certainly far exceed 300 million by the year A.D. 2000, and there is evidence for suggesting a much higher figure.[1]

It is appropriate at this time to illustrate the general trend towards substantial increase by taking India as the example, and by drawing freely on a recent pamphlet by Professor A. V. Hill.[2] He remarks that "There are over 400 million people in India to-day—more than eight times the population of Great Britain; and they are increasing now by fifteen per thousand annually, about six millions every year. The mortality is very high; at every age up to fifty-five it is four to eight times ours. . . . Only half the people born reach the age of 22, with us two-thirds reach 60. Of Indian girl babies born, only 57 per cent. reach child bearing age, compared with 88 per cent. of ours; and although in India only about half the girls who reach that age survive to the normal end of the child bearing period, as compared with 89 per cent. in England, they nevertheless produce on the average twice as many babies as English women do. As public health measures and nutrition improve, the mortality will diminish and the population will increase still faster. . . . The present rapid increase of population is a sign that conditions have substantially improved in recent years. . . . The first of all India's requirements, if she is to be happy, efficient, and prosperous, is better health, and that implies beyond everything more and better food. But the immediate consequence of better health and better food is a lowering of mortality, which means a further increase of population. . . .

"In quality and calories together India needs at once at least 50 per cent. more food than she now has: give her that and her population will increase not by 15 per thousand per annum but by 20 or 25—it is already 20 in the Punjab. Then in thirty years or so the food supply will have to be doubled again, to be three times what it is now. . . . If disaster can be staved off for thirty years, education, public health, and public opinion together may by then have produced a new outlook on the reproductive impulse, and so the situation may come under reasonable control. It depends very largely on the women of India that this should occur; then the plans of longer range for raising the standard of life all round can hope to bear fruit. . . .

"Wishful thinkers say that we have only to raise the standard of life and the birth-rate will automatically come down. By *how much* shall we have to raise the standard of life before the expected result will be obtained? And

[1] Kuczynski, *ibid.*, p. 116.

[2] 'India: scientific development or disaster.' India-Burma Association, 1944 (The text of an Address to the East India Association on 4 July 1944.)

will not the first effect be the wrong way round? . . . Others . . . put their trust in industrialisation; but throughout the nineteenth century, the age of industrialisation, the population of England and Wales steadily increased, in spite of emigration, by 12–18 per cent. every ten years. . . . Others look to education . . . but that is bound to take a long time, and birth-control has to encounter the fiercest prejudice of religion and custom before it is commonly accepted. . . .

"Let us see what this means. Let us assume that under the influence of gradually improving nutrition and better health the present rate of increase of population of 15 per cent. per ten years rises in successive decades to 18 per cent., 22 per cent., and 25 per cent. Then, in thirty years there will be 730 million people in India. If, by then, the food available per person is 50 per cent. more than at present (in value, *i.e.* in quantity and quality) the annual food production after thirty years will need to be 2·7 times as great as at present. Allowing a little for safety, plans must be made at once for increasing the food production of India threefold in thirty years. . . ."

That then is Sir A. V. Hill's conclusion with regard to India: a population increase from 400 to over 700 million within a few decades, and a real requirement of food three times what it is now. A new Department of Planning and Development in India is now in action. The increased quantities of food which must be made available are enormous. As a rough measure it may be said that 1 oz. per day extra for everyone in India involves, at present, a total of roughly 4,000,000 tons per year. Over a million tons of extra food is needed each year to feed the present annual increase of between five and six million people. Indian leaders, and others with the well-being of India as their goal, are tackling the problem, and great schemes have been put forward to press on with increased production and agricultural efficiency. Clearly it is of leading importance to the individual that the rate of increase of the availability of food, and of materials for physical well-being, should exceed substantially the rate of increase of the population. In other words, it is the relative rates which matter. The duty of the rest of the Commonwealth and Empire is surely to do all possible to increase food production and to help India in her need.

India is not however an isolated example of present trends. A parallel course will probably be run by China if conditions improve. She holds another fifth of world population, with a mortality rate probably exceeding that of India. Indeed there is doubt whether her population has risen at all in recent decades. The same pressure on the means of subsistence, the same low standard of living, the same high mortality at all ages, is very evident too in such geographically circumscribed areas as Egypt and the West Indies. Both have rapidly increasing populations. Recent reports on the West Indies have recognized the position, though laying far greater stress on the partial solution of present problems than on facing the longer-term realities of the coming years. "The total population of the British West Indies is estimated at approximately 2,800,000 at the present time and is increasing at the rate of nearly 2 per cent. per annum. This increase means, in Jamaica for instance, an additional 20,000 persons annually in need of work or occupation." [1]

[1] Sir Frank Stockdale, 'Development and welfare in the West Indies,' p. 1. Colonial No. 189. 1945.

Egypt must receive special mention, for here, it would seem, great exertion is scarcely leading to the expected reward. Those who have served long in Egypt will tell you that despite the change in the last fifty years from basin to perennial irrigation, despite the building of dams and reservoirs and the control of the Nile on a gigantic scale, despite improvements in agricultural technique and the import of hundreds of thousands of tons of fertilizers annually, the standard of living of the mass of the people has fallen rather than risen. In Napoleon's day the population of Egypt was about 2½ millions [1]; in 1880 it was about 6·8 millions; [2] and now it is probably about 17 millions. The rate of increase of the availability of food seems not to have kept pace. Exertions in the fields of agriculture, engineering, and public health continue.

To turn again to south-east Asia, rapid increases have been going on elsewhere than India. Ceylon is an example. In 1850 she had about 1·6 million people; in 1900 about 3·6 million; in 1930 about 5·3 million; today about eight millions.[2] Java, with its fertile soil and ample rainfall, has multiplied exceedingly in the period since order was established.[3] In 1815 there were about 4·5 million people; in 1900 28·4 million; and in 1945 about fifty millions. This more than ten-fold increase in one hundred and thirty years, the equivalent of four or five generations, has been accomplished with very little change in the basic mode of life of the agricultural peasantry, and with very little change too in the standard of living. Carr-Saunders remarks, in summing up the situation: [4] "Whatever the precise course of events, there can be no doubt that the contrast, which already exists between these countries" (India, China, Java, Formosa, Philippines, Japan, Ceylon, etc.) "and those of Europe or of European origin, will be sharpened in the near future. Europe and its overseas derivatives will be engaged in a struggle for population; these countries will be entangled in the difficulties which arise from excessive numbers. This will bring up the question of the half-developed countries which are mostly under European control. . . ."

Migration is considered by some to offer a solution to many problems. Successful and desirable migration involves two processes, one physical and one largely psychological. The physical aspect is that of transport and organization. If it is hoped that India's problem may be met by draining off the annual population increase in planned migration, that hope is set too high. India's net increase daily totals fifteen thousand. Sufficient shipping could scarcely be provided, quite apart from all other considerations. From the psychological aspect, it is evident that no acceptor country will want to receive immigrants at a rate faster than that at which they can be absorbed culturally and politically. This rate of absorption is commonly slow, even when the immigrants are not actively trying to retain their group identity and are not visibly divided from the acceptor population by colour or other physical particularities. At this time, when population increases in the world are unprecedently rapid, deliberately imposed checks to migration are greater

[1] Carr-Saunders, *ibid.*, p. 34.

[2] *Ibid.*, p. 280.

[3] Karl J. Pelzer, 'Pioneer settlement in the Asiatic Tropics,' p. 160. *Am. Geogr. Soc. Spec. Publn.* No. 29. New York, 1945.

[4] Carr-Saunders, *ibid.*, p. 293.

than they have ever been before. It is evident that migration cannot solve the problems. At best migration can be a meagre palliative.

Fortunately, there are in the world a number of great countries which have huge exportable surpluses of food and other biological materials, so that in recent times, despite the real and unreal problems set by transport and finance, major famines have been infrequent. Chief among these producers of surpluses are the great Dominions of the British Commonwealth, the U.S.A., and Argentina. The Colonial Territories of the British Empire, so diverse in political evolution, are equally diverse with regard to population increase and increasing availabilities of organic materials. Reliable and complete comparison is difficult owing to the weakness of official statistics, especially with regard to the numbers of inhabitants. But in most Colonial territories, increase of the standard of living, which we now realize to be desirable, is likely for a period, at least of a few generations, to lead to increases of population, and hence to still heavier requirements of materials produced by the agency of living organisms.

We must then, at this stage in our consideration, conclude that if we are successful in our plans for bettering the lot of the individual, and probably even if we are not, the population of the world will increase substantially in the next few decades and probably generations. Equally we must conclude that during this period we have got to increase the availability of food and other organic materials in much greater proportion. Is this increase in fact possible, are we capable of achieving it, and are our present efforts yielding results at the rate required to meet increasing need? It has already been stated that some factors in the environment are helpful and some the reverse. Here too, relative rates of action are of great importance. Let us first consider some of those factors or trends which appear to help towards important increases in the production of organic matter for man's use.

There are certain areas of the world where the land is properly cultivable, but in fact is not cultivated, because there are not enough people available on the spot to do the job. The Amazon basin, parts of Burma, New Guinea, and Sumatra are examples. The migration of agricultural labour would be advantageous if total production were the sole criterion. But, as we have seen, the need for immigrants, to permit the maximum development of an area, frequently exceeds their acceptability and the rate of psychological and political absorption. Even so, some contributions in organic supplies may yet be made by what remains of the world's pioneer areas. Additional areas may be brought into agricultural production by means of new irrigation systems and by the extension of old ones. The Nile system affords the most widely known example. Plans are well developed for a continuance of the process of full utilization of its waters.[1] Already for some months each year no Nile water enters the sea direct. The sea receives only the water pumped from the main drains after passage through the soil of the irrigated lands. India's problem in particular has been stressed, so it should be realized that the irrigated area of India, some 70 million acres, is already more than three times the irrigated area of the U.S.A. (the second on the list of countries with

[1] H. E. Hurst, "A short account of the Nile Basin," Physical Dept. Paper No. 45. Cairo, 1944.

irrigation), and more than the combined total of the ten countries with most irrigation after India.[1] Yet presumably, the greater the dependence on irrigation, the greater the danger in times of periodic or abnormal drought. India now has still further great plans and projects for irrigation which will pay their dividend in increased supplies of organic matter.

Another way in which the crop-bearing lands of the world may be increased is illustrated by the northward push of the wheat-belt in Eurasia and North America during the last fifty years. This has been made possible by the use of faster growing and earlier ripening varieties of wheat, obtained by selection and the process of vernalization of the seed grain. Swedish foresters have recently made somewhat similar advances, as yet in embryo, by the selection of rare, naturally occurring, faster growing, polyploid saplings.

There is still much to be done all over the world, not least in British Colonial territories, in the advancement of agricultural technique and animal husbandry. Only efficient, high yielding plants and animals should occupy the limited areas available. The plant and animal geneticists, and the experts in cultivational technique and animal management, have all much to give. There are exciting new possibilities now open to the geneticists armed with a novel tool, the drug colchicine.[2] Equally is there much to be done by those skilled in the control of plant and animal diseases, both in the living crops and herds and in stored products. Fungi are the main causal agents of disease in plants.[3] In the U.S.A. alone in 1935 the losses from rusts on wheat, oats, and barley were estimated at 277, 185, and 53 million bushels respectively. World cocoa production is said now to be falling as a result of witches broom disease in the eastern Caribbean region and South America, and swollen shoot disease in West Africa. Many examples could be cited of what has been achieved already. The advance can be expressed conveniently as increased yields per unit area, or as increased animal weights per unit of feeding stuffs. That is to say, great advances have been made, and can continue to be made, in the actual productive efficiency of the living organisms which are our means of subsistence. But the distribution of these improvements over the world is extremely uneven. There is far to go before we can reap the full benefits, even of the improvements already known to us.

Similarly, there are great strides to be made in the development of fisheries, and considerable efforts are being made to that end, both in the freshwaters and in the sea. Fisheries have the advantage that we can reap where we have not sown, and we can reap in the open, little hampered by the habits and habitations of men. With few exceptions however, the fisheries of the world are limited so far to the shallow waters overlying the continental shelves, and include only those fish which live on the bottom and near the surface. The main mass of the waters of the world, the great ocean areas, have not yet been called upon to yield a harvest. There are still important advances to be made in the actual technique of fishing. For example, the extensive use of powerful

[1] *The Times* of 27 November 1945, reporting a Viceregal statement.

[2] See, for example, C. H. Waddington, Lecture at Royal Institution on 12 February 1942, reported in *Nature*, No. 3800 (1942), 259.

[3] J. Ramsbottom, "Fungi and modern affairs." Substance of three lectures at the Royal Institution in February 1944, reported in *Nature*, 153 (1944) 636.

lights at night far out in the oceans has promise which warrants much greater experiment than it has yet received. In this connection too, it is to be remembered that the oceans contain extremely large quantities of organic matter, minutely dispersed in the bodies of small organisms. Some day, I suggest, we may find it desirable and feasible to draw direct upon this supply; but of this we are not yet technically capable. So far we have used the fishes and the whales as our collecting apparatus.

Let us now look on the other side of the picture, at those factors and trends which are unhelpful.

Stockdale, speaking in particular of the West Indies, has pointed out that [1] "Most people in moist, hot tropical climates do not want to work very energetically for long hours: they seem to prefer to be satisfied with a lower standard of living and more leisure and they would, it appears, rather take life easily than add to their material comforts. This is an outlook which no one has a right to condemn but it carries with it the corollary that the standard of living of most workers in such areas cannot be expected to rise enough to be comparable with western standards." That is a point which is too often overlooked.

Processes of land degradation are now world-wide in their distribution, but vary greatly in incidence, cause, and local importance. Local decreasing fertility and crop yields are often early symptoms of that disease which may develop into gross land degradation. Such degradation and erosion is now recognized as being ancient in local but recent in widespread incidence. Jacks and Whyte, among others, have done particular service in summarizing the seriousness and extent of erosion and in diagnosing some of its many causes, both physical and economic.[2] The immediate agencies of erosion are wind and water, following removal or damage to the pre-existing plant cover. The causes of this damage are usually associated with improper exploitation in grazing, ploughing, firing, felling, or the collection of domestic fuel. This improper or too violent exploitation is itself the result of pressures, financial, biological, or otherwise.

In the United Kingdom our gentle and tolerant climate, together with the peculiar consistency of most of our soils, allows us to behave in a way which elsewhere in the world would rapidly lead to extensive erosion. The steepness of slope which can be safely ploughed is one example. This relative immunity has no doubt played an important part in blinding us too long to what was happening in the territories under our administration. There are now few countries in the world where land degradation, in one form or another, is not of major importance. The four Dominions, India, and many Colonial territories are all afflicted in varying degree. Vigorous countermeasures have been taken in the U.S.A., the land of pioneers both in spoiliation and in eventual costly cure.[3] In many parts of the Empire plans have yet to give way to practice on the large scale.

[1] Stockdale, *ibid.*, p. 12, para. 61.

[2] G. V. Jacks and R. O. Whyte, (i) 'Erosion and soil conservation,' Herbage Publn. Series, Bull. 25. Imperial Agricultural Bureau, Aberystwyth, 1938; (ii) 'The rape of the earth.' London, 1939.

[3] Russell Lord, "Progress of soil conservation in the United States," *Geogr. J.* 105 (1945) 159–69.

In aggregate, the result of land degradation, in its diverse forms, is that great areas of the world are producing less organic matter for man's use each year than those areas should properly produce. This process of degradation tends to be both accelerative in action and accumulative in result. The necessary countermeasures are usually obvious. But they take time, often at the cost of still further reduced production, before their cumulative effect can be seen and felt. Frequently, the degradation itself is a result of the rapid growth of the local population, whose pressing needs retard the necessary countermeasures.

Allied to this problem of land degradation is that of the irrational, over-exploitation of biological stocks. Each one, whether it be whales, wood, wheat, or wool, has a rational cropping rate, determined by the natural rate of growth and increase, and the local environment. Exploitation at a rate which exceeds the rational results in reduced yields later: it is stealing from the future. Yet over a wide range of biological production, living stocks, both of plants and animals, are being over-cropped to our own present and future detriment. This process, too, tends to be accelerative in action and accumulative in effect.

A large proportion of the forest lands of the world are still being over-cut, the yearly fell exceeding the annual increment of woody substance. Frequently forest is so used that it at once ceases to be forest, both regeneration and replanting being almost absent. The land is then often rapidly degraded and produces nothing of value. These remarks are particularly true of the coniferous soft-wood forests of the northern hemisphere, which at present supply the bulk of our immense requirements of timber and pulp. Though various parts of the Commonwealth have long had excellent forestry services, in general the Anglo-Saxons have been rude exploiters of the forests which they have met in their world of expansion.

Likewise, it is regrettably true that a large proportion of the most important fisheries in the world, particularly the trawl fisheries of north-west Europe, were being over-fished until the war stopped them. The result was most evident in reduced yields per man-day using the same gear. In these instances economic over-fishing often precedes absolute over-fishing. During the second war, as in the first, stocks have built up again to a considerable degree. But it is still questionable whether our powers of mutual trust and international cooperation and organization will enable the cropping of the stocks of fish to be deliberately adjusted to their rational annual harvest on a basis of sustained yield. The whale fisheries of the world, and the seal fisheries, have provided some of the worst examples of wasteful, irrational exploitation.

Many areas of the world are at present being over-grazed. The grazing and browsing herds of domestic animals are consuming more than the annual crop of new vegetation. The result is a smaller production of new plant substance in the following year—and so the process continues. Thus the land is able to carry a progressively decreasing density of animals and the returns to mankind are less than would be obtainable, on a sustained yield basis, under rational management. Over-grazing in South and East Africa are examples from among many. Control is essential, and often systems of rotational grazing may be advantageous.

Conservatism and the continued use of obsolete varieties, techniques, or customs also account for a less than rational production from many areas of cultivated land. Conservatism can be combatted by education, so that this process also comes within the orbit of our consideration of mankind and his needs. Education resembles many of the processes already mentioned in that it too is both accelerative and accumulative in action and results. Conservatism of food habits provides additional difficulties, especially when tinged with so-called religious scruples. The more educated British may be persuaded to eat succulent whale meat. The habitual eaters of particular cereals are only with difficulty turned over to a novel species. The Lord Woolton of Japan, early in the war, was praising the merits of cats stuffed with locusts.

Unnecessarily low yields are also frequently to be attributed to unsatisfactory systems of land tenure. Excessive fragmentation, sharing, frequent redistribution of village lands, strip cultivation up and down the slope, and other anachronisms are common examples. All of them are a particular hindrance to the planting of trees and any form of conservation cultivation. In Cyprus excessive fragmentation is often carried to the absurdity of tiny plots jointly owned by several shareholders, while the few existing fruit trees on those plots are often jointly owned by a further set of dwarf shareholders. North Syria provides examples of strip cultivation where the width of the strip may be a couple of yards and the length a mile.[1]

These then are the circumstances to which I would draw your attention. Particular areas of the world, and the world as a whole, have populations which are rapidly increasing, a process which is likely to go on for several generations. The people have to be supplied with organic materials which can only be supplied by the cropping of living plants and animals. The amount properly needed by each individual is much more than, on the average, has ever been available so far: the deficiency is measured in misery. There are certain processes at work which are favourable to increased availability for the individual, and there are other processes and circumstances which are unfavourable. Many believe that service to others is a constant duty, and that therefore we should press forward in our efforts to provide health and adequacy for every individual. The question is whether adequacy is possible now and in the future, and whether we are acting with vigour enough to attain it.

It is clear that quantitative assessment of all the factors is necessary. The task is full of difficulty, but not impossible. We need quantitative data to determine whether policies for betterment are, first, theoretically capable of yielding the desired results, and secondly, are being put into effect at appropriate rates to attain those results. So far even our knowledge of the total number of mouths to be fed is largely inadequate. Our knowledge of population compositions and replacement rates is still mostly insufficient to enable us to predict population changes with any confidence. The superstructure of development must surely rest on a foundation of properly assessed needs, and those needs are directly proportional to human numbers and human increase.

To return for a moment to India. Despite all the present plans for economic

[1] K. A. H. Murray, "Feeding the Middle East in war time," *Royal Central Asian Journal*, 32 (1945) 242.

development, despite the hard effort already put into the work, few can feel confident of real success. So it will come about that India, and probably other parts of densely populated south-east Asia, will gradually lean more on outside areas to feed their teeming millions. Those outside, if they are filled with faith that the many should not starve, must render aid. It would be wise to plan to meet this position. More fortunate territories must develop their total production of organic materials far beyond what is needed to meet their own, yet unmeasured, future needs.

But the rapid development of biological production involves two chief processes: one the knowledge of what should be done, the other the doing of it. At present, in most areas, knowledge is far ahead of practice. Practice, consequently production, is very largely dependent on the actions of a great diversity of individuals all over the world who have in common one particular attribute: conservatism. Education and demonstration are the standard and the desirable methods of overcoming conservatism and so leading on to improved techniques and larger production. I have already suggested that education and its results are accelerative and accumulative. This is fortunate; but it may well be, when quantitative assessment of the factors has been carried out, that instances will occur in which the results of education are demonstrably insufficient. For example, there may be areas in Africa where native habits and conservatism, combined with increasing numbers and the interplay of those environmental factors which we have been considering, are preventing that relative increase of availability which must be the aim. If this is so, if education and demonstration are insufficient, it may, however regrettably, be necessary for a time to resort to coercion. An unpleasant doctrine, indeed; yet what is the alternative? The quantitative data, relating to numbers, needs, and the environmental factors involved in production, must be obtained and action taken in accordance with the results.

In conclusion, this is the plea in this matter of population trends relative to the world shortage of biological resources. Let there be appreciation that the background is dynamic, that the relative rates of the factors is of immense importance, and that eventually active and voluntary adjustment of populations will be as inevitable as it is already desirable. In our attempts to make supplies match needs more adequately than now, let policies be based on real assessment of quantitative data rather than on half-knowledge and guesswork. Let there be appreciation that these matters are desperately urgent.

DISCUSSION

Before the paper the PRESIDENT (The Rt. Hon. LORD RENNELL OF RODD) said: We are to have a paper this afternoon by Dr. Colin Bertram, Fellow of St. John's College, Cambridge, a biologist of considerable experience. He has investigated the problem of animal life in extreme conditions in Bear Island, eastern Greenland, and the Antarctic on the British Graham Land Expedition. During the war he worked for the Colonial Office in Palestine and the Near East in connection with the development of natural resources for human use. As a result he has been led to consider the question of the improvement and integration of regional resources in relation to optimum population and the abolition of want. We have with us certain eminent representatives of colonial activities and life, and later

I shall be asking them if they are willing to contribute to the paper. The subject is one of the greatest possible importance to the future administration of our Crown Colonies and the British Empire generally.

Dr. Bertram then read the paper printed above, and a discussion followed

The PRESIDENT: Sir Frank Stockdale's name has been mentioned more than once during the lecture. It would be of great interest if he would add a word or two, especially, in the light of Dr. Bertram's remarks, on the plans for colonial welfare and development, and how far those plans are directed to the solution of the problems to which Dr. Bertram has referred.

Sir FRANK STOCKDALE: Mr. President, I am afraid that you have set me rather a difficult problem. In connection with the planning of colonial development and welfare, the Secretary of State has definitely informed the colonial governors that he wishes comprehensive plans to be prepared, covering various aspects of economic development and the social welfare of the people concerned. Those plans are now beginning to come in. Many of them provide for extended agricultural and economic activities, and for further extension of educational, health, and other services.

The problems put before us this afternoon are of considerable seriousness, not only in the world in general but in many parts of the colonial empire in particular. In my early days I was associated more with agricultural development and with checking the degradation of soil—degradation which in many parts both of Africa and of the colonial empire is largely man-made. Recently I have been in the West Indies and I have realized that the population problem in that area is a serious one. As your lecturer has told you, the population of the West Indies, small in comparison with the population of the rest of the world (about two and three-quarter million), is increasing at the rate of almost 2 per cent. per year. In those West Indian colonies, most of which are merely the summits of a mountain range partially submerged, where lands are steep and severely broken by volcanic activity, the area of land for agricultural purposes is strictly limited. There are areas which have suffered severely from erosion and in which soil fertility has markedly decreased. I know one area in the northern end of Montserrat which, forty years ago, was fairly well covered by forest growth, but is to-day eroded right down to the rock. In the past the West Indies have never produced sufficient food for their population. They have had to depend upon imports. It is equally so to-day; and yet in that area there is an increasing population together with soil degradation.

Naturally, in our plans for the West Indies, we have given much attention to this problem of soil erosion and agriculture. We believe that, with a change in the agricultural system, and with greater intensification of production, it should be possible to increase the present output by at least 25 per cent., and possibly 50 per cent. At the same time, it is possible to check erosion in many areas. Soil erosion is no mystery; the control of it rests upon the application of common sense. In many areas it is a matter of checking the flow of water down the slopes. In that connection, it is a pleasure to note what has taken place in St. Vincent in the last two years. Flying over that little island you will now see rows of upright grasses along the contours, which have been planted by the people themselves. It took a little time to get started, but we have found in the West Indies that when the people get interested and realize that they must do something to protect their coming generations, then we get a community spirit which helps towards increased efficiency and increased production.

I am not claiming that intensification of agricultural effort is going to solve the whole problem in the West Indies, because there are areas where there are

limited possibilities and where the populations are already excessive. There, industrialization and diversification of production may be means of providing or maintaining a standard of life which, although not high, is a standard to which many of those people have become accustomed.

As your lecturer told you, it is difficult to get tropical peoples to abandon the existing standard of life. I could give figures, but I will not weary you with them. Suffice it to say that in Trinidad before the war certain agricultural workers were earning an average of about thirty pounds a year. During the war wages increased and are still increasing, and yet the workers' average annual income did not exceed thirty-one pounds or thirty-two pounds a year. The people seem to be satisfied with a standard of life which it is difficult to raise. Nevertheless, there are others who are progressive, who have enterprise, and to those progressive elements we have given considerable encouragement.

I would also—and I do this with some diffidence in the presence of Lord Hailey and others—refer to the degradation of soil which is taking place in many parts of Africa, particularly in East Africa. In Kenya there is over-population of native reserves, with soil erosion which has become most severe. Parts of Tanganyika are equally seriously eroded because of the excessive population in certain of those areas which are affected by the tsetse fly. The tsetse still hold control over large areas of Tanganyika and of East Africa. Once we can get control over that problem there are possibilities of extending production, largely the production of foodstuffs.

Those are two examples, Mr. President, of our problems in the colonial field. You may think I am a little over-stressing the question of the degradation of the soil, but it is a really pressing question, and if we are to provide increasing populations with land which they can use as a means of earning a satisfactory living, then it is a problem to which we must give most earnest attention. Progress has been made, both in East Africa and in the South African High Commission territories. A considerable amount of work on the control of soil erosion has been started; but in East Africa generally the war-time drive for food production has, on the whole, hastened erosion. It was necessary to make every effort to secure increased supplies of food to feed the military units in the area, and also the peoples living there, because of the interruption of shipping. With the food shortage at present world-wide, this endeavour will have to be continued, and there is serious danger that erosion will be accelerated for at least the next few years.

There is one other aspect on which I would like to touch briefly. It was not alluded to by the lecturer, but it is a point to which we are giving considerable thought at the present time, and that is the possibility of producing, by biological or chemical means, foods which are not commonly recognized, or not commonly used, at the present time. I refer particularly to recent research on the production of food yeasts from by-products of the sugar industry, and to the experiment which is now being made with the pilot plant in Jamaica for the production of food yeast from molasses. The production is only on a small scale, but we hope it will do much to help improve the nutrition of the people, not only of the colonial empire, but elsewhere. The pilot plant is at present in production, and quantities of food yeast are to be shipped to Malaya, Hong Kong, etc., and possibly to India, in view of the present shortages of food in the East.

I have not touched at any great length on the main theme of Dr. Bertram's paper, but I can assure you all that I have listened with the greatest interest to a paper which should receive the most earnest thought and attention. This problem of population is a very acute one. Professor A. V. Hill has referred in

vivid terms to the position in India. We know that the position in China is equally bad, and we realize that in many parts of the tropical world, and in the world in general, the population problem is one of the most serious which we have to face. Your lecturer has given you arguments on the one side and figures on the other. He has not given you the solution, and I do not think you would ask that of him. But I would emphasize that it is a problem to which we must all give our most earnest consideration.

The lecturer referred to the possibility of increasing crop yields, and undoubtedly yields can be increased. Whether it be by improved animals or by improved plants, those improved stock or plants require more food than the unimproved. Therefore it is a question of balance between what is required to get that improvement and what is required to preserve it.

The PRESIDENT: I was glad to hear Sir Frank Stockdale refer, not only to the immediate matters on which the lecturer touched, but also to some of the work being done in producing new foods, such as the yeast experiment. It must seem to many of us that if the programmes put forward by the Colonial Office and other imperial authorities are all *ad hoc*, each to their own area, we may risk aggravating the problem by not regarding it as a whole. One would like to see planning on the lines of new developments in food production for the benefit of all. The lecturer spoke of one particular instance of an immense increase of food production in India, to which, possibly, Lord Hailey, who is here this evening, has contributed more than most people. It is on that subject that I invite Lord Hailey to speak.

Lord HAILEY: Sir Frank Stockdale has thrown a most interesting light on many points raised in the lecture, in the course of what he has told us about plans for colonial development. My own personal experience has been mainly in India, and the President has referred in particular to my interest in the problems of irrigation.

Irrigation, as we use the term there, is not limited to major schemes of irrigation. It includes also minor schemes, such as irrigation from dams, and an immense amount of irrigation from wells. There is no doubt that we have effected a vast improvement in the conditions of India by the extension of irrigation directly financed by the State, and by the great expansion of well irrigation which British rule has made possible. But we are, I think, coming near the end of the potentialities of major irrigation schemes. The waters of the great rivers have been, with one or two exceptions, fully utilized, and much of the work of the future must consist in the exploitation of subsoil water resources. Here the extension of hydro-electric installations will prove of great advantage. We already have in Northern India examples where electric power is utilized for raising subsoil water for irrigation.

But how far can we hope, by these or similar means, to provide subsistence for the continuous increase of population to which the lecturer referred? Already, as the economists tell us, the increase in population has overtaken the increase in production, even at the existing standards of life. And those standards are of course far below an optimum standard. I myself fear that whatever efforts may be made to increase the means of production, they cannot cope with the increase in population if it continues at the present pace.

And there are other factors which have to be considered, all of which present obstacles to the necessary increase of production—factors which have their origin in social custom. The fragmentation of land has in some parts reached a stage far in excess of the examples which the lecturer gave from the Mid-East. In other parts the existence of landlords, who make no contribution at all to the rural economy, are a heavy burden on the land. Elsewhere there are

problems of soil conservation demanding firm and drastic treatment. There are here problems of a class with which we ourselves have never felt able to deal effectively. We are now giving up control of India. Can we hope to see an Indian Government which will have the determination to deal with them?

I admit that there is some evidence already of social change for the better. In the Punjab, for instance, marriages now take place at a much more mature age. But in very many other respects change is slow, and I cannot myself share the rosy anticipations which I sometimes hear of a future which will allow scientific and material improvements to exert their full value. It is a profound truth, sometimes overlooked, that the standards of life of any community must depend not merely on the natural resources of a country, but on the capacity of its people to make the best use of them. The realization of this fact must make us hesitate to share the belief, so often expressed, that we may in some near future achieve something like the optimum standards of life throughout the world.

Dr. DUDLEY STAMP: In view of the lateness of the hour, I will not do much more than most cordially congratulate the Society on having so wide a survey in so important a field put before it in such a lucid manner.

If there is one point which especially impressed me it is the realization that in the past the world has lived so much from hand to mouth, and that as we look forward we see the need to plan our resources and their use on a comprehensive scale. In this connection there is the supreme importance of land-planning; and as soon as one comes to think in terms of securing the optimum use of land I personally feel the inadequacy of our knowledge in many directions. It seems to me that comprehensive surveys, particularly of our colonial empire, are much overdue.

We have seen in England during the war a most amazing phenomenon. I doubt if even the most sanguine of our agriculturists would have believed in 1938 that we could increase our agricultural production to the extent we have with the somewhat haphazard arrangements during war. That is an indication of what may be done in the world as a whole.

In the past there has been competition between industry, housing, and agriculture. This should not be. What we need is a comprehensive plan of land-use to serve all the varied needs of the population. I hope, Mr. President, that this Society will take a lead in fostering detailed studies of all aspects of land-use, in order that the world may plan its production and consumption; for I cannot believe that we have so far reached anything like the limit of world production.

I am often reminded of a most interesting figure which was given us some time ago when we were in the midst of the plough-up campaign. One million acres of new ploughed land was our objective, and we were told that a 10 per cent. increase of yield on the existing average, that is from 35 to 38·5 bushels an acre in the case of wheat, would have given the same result. There is the same possibility in all parts of the world.

Dr. H. L. RICHARDSON: I have been out in the East for a number of years and have come up against the population problem at first hand, so that I realize what a dangerous problem it is. I have given a great deal of attention to the possibility of increasing agricultural production. It happens that for India and China I have come to much the same conclusion as Sir Frank Stockdale has for the West Indies: that by using modern agricultural methods we may hope to increase production by 25 per cent. within a decade or two; it may be 50 per cent. over a much longer period. But that is nothing like enough to deal with a population increasing at the rate mentioned.

Perhaps living in the East makes one rather brutal. I wonder whether we can face the fact that if modern health services are to be introduced they will remove some of the existing checks on population increase, and that will make the problem worse than ever? The only hope of dealing with it then will be by introducing birth control; and this should be done by the doctors and public health experts who are now concerned with reducing the death-rate. It is their responsibility. Otherwise, I can only see one famine after another.

The PRESIDENT: I am sure you would wish me to thank Dr. Bertram for his extremely interesting and provocative paper. The problems he has raised are not new ones; similar problems have been overcome in the past. It is for us to see whether we are wise enough in our generation to overcome the problems of our day; though I must confess that the mood left by both Dr. Bertram and the speakers who followed is one of hoping and doubting. On your behalf I thank Dr. Bertram very much indeed for his paper.

NEW MEDIUM AND SMALL SCALE MAPS OF THE ORDNANCE SURVEY

MAJOR-GENERAL GEOFFREY CHEETHAM, D.S.O.,
Director General, Ordnance Survey

Afternoon Meeting of the Society, 10 December, 1945

THE IMMEDIATE post-war programme of the Ordnance Survey has been announced in Parliament by the Minister of Agriculture and Fisheries.[1] The reference to small and medium scale maps was as follows:

> "The rapid publication from existing material of maps, partly of a provisional nature, incorporating the National Grid, on the 6 inches to the mile and all the usual smaller scales except the ½ inch to the mile. These maps will incorporate revision carried out both for military and civil defence purposes during and immediately before the war. It has not been possible previously to release this revision for general publication.
>
> "The rate at which it will be possible to carry out this programme must depend on the man-power situation, but the Ordnance Survey is making preparations for its implementation."

The above programme is based on the recommendations of the Departmental Committee on the Ordnance Survey, whose Final Report was published in 1938, modified to meet the present changed circumstances. The following recommendations of this Committee apply to small and medium scale maps, the numbers quoted being those of the Report. (3) That a National Grid should be superimposed on all large scale plans and on smaller scale maps with certain exceptions to provide one reference system for the maps of the whole country. (4) That the International Metre should be adopted as the unit on which the grid should be based. (7) That the 1 inch to the mile and smaller scales should be retained in their existing form. (8). That the existing Six Inch plates should be retained for printing on demand for special purposes. (9) That the scale of six inches to the mile should be retained and that maps on this scale should be produced in the new National Series in a square shape and containing twenty-five 1/2,500 plans. (10) That a new medium scale of 1/25,000 should be tried out experimentally in certain selected areas, and if successful should be extended to cover the whole country in a National Series.

The Report of the Departmental Committee was discussed at an afternoon meeting of this Society in January 1939 and its recommendations were generally approved. I shall therefore not discuss the reasons which led to them, but shall confine myself to describing the way in which the Ordnance Survey is trying to give effect to them.

[1] *Hansard*, vol. 410, p. 838.

The National Grid

In its application to small and medium scale maps the National Grid may be considered purely as a reference system. It consists of a representation of the squares on which the new maps of the country on all scales are constructed. The incidence of these squares on map detail in England as far north as Scarborough can be seen on sheet 2 of the new 1/625,000 map of Great Britain. The lines forming these squares will appear in the same relation to the detail on any map on any scale. The distances apart of the lines shown will, of course, depend upon the scale of the map, as it is desirable to make the interval sufficiently small to enable a sub-division into tenths possible by eye, and sufficiently large to avoid interference with the legibility of the map. At the 1/625,000 scale the interval chosen is 10 kilometres.

Full value from the grid reference system can only be obtained if a systematic method of recording references is used. The Ordnance Survey has devised a system and has numbered the grid on all its maps so that it can be used throughout. The surface of the whole country is divided into squares of 100-kilometre side. These squares are numbered by the number of hundreds of kilometres in the coordinates of their south-west corners. The easting coordinate is always given before the northing. This system of squares is shown in Fig. 1. The reference to any point inside the numbered squares is then given by reading and estimating its coordinate. As before, the easting coordinate is given before the northing. This is illustrated in Fig. 2, where a point whose full coordinates are East 538932, North 177061 is seen to lie in square 51 and to have within the square a reference 389770 defining its position to the nearest 100 metres. Such a reference is known as a Normal National Grid Reference. A similar reference will occur in each 100-kilometre square, and it may therefore be necessary to quote the square number, 51/389770. This is known as a Full National Grid Reference.

The method of numbering the grid lines on maps at varying scales is shown in Figs. 3 and 4. On the One Inch, 1/25,000, and Six Inch maps (Fig. 3) the grid lines are spaced at intervals of 1 kilometre. Two figures are shown in the margins against each grid line and denote respectively the tens and the digits of kilometres in the ordinate of that grid line. On the Ten Mile and Quarter Inch maps (Fig. 4) the grid lines are spaced at intervals of 10 kilometres. Single figures are shown in the margins against each grid line and denote the tens of kilometres in the ordinate of that grid line. These marginal figures enable each grid line to be readily identified and the grid references to be quickly given. Thus, to give from a One Inch map the grid reference of the point already referred to in the above example (Fig. 2), first read the large figures printed in the margin of the map opposite the north–south grid line bounding the western edge of the square in which the point lies. These figures (38) are respectively the tens and the digits of kilometres in the easting of that grid line, and they form the first two figures of the Normal National Grid Reference. Next, estimate within the square how many tenths of a square the point lies away from that grid line towards the next. The number of tenths (9) completes the easting of the point to the nearest 100 metres, and is the third figure of the reference. A similar process using the set of grid lines at right angles to those already used gives the northing of the point and

the last three figures of the reference (770). The complete reference is then 389770.

A comparison with the references obtained by using the old system of 2-inch squares is given below for Salisbury Cathedral spire. This shows that the National Grid always gives the same reference, no matter what map is used to obtain it.

Map References to Salisbury Cathedral Spire

	Old System	*National Grid*	*Reference*
	Metres		
Full coordinates ..	−41962·11 East	414298·31 East	
	+49859·53 North	129532·12 North	
10 Mile Map ..	T 9	41/1429	Full Four Figure Reference: to nearest kilometre
¼ inch 3rd Edn. Sheet 11 ..	E 9	41/1429	
¼ inch South Central Sheet ..	O 4	41/1429	
½ inch Sheet No. 38	B 4	41/142295	Full National Grid Reference: to nearest 100 metres
1 Inch Pop. Edn. No. 122 ..	H 7	41/142295	
1 Inch "Salisbury Plain" Special Sheet	K 10	41/142295	

Small scale maps

I will now explain how we are attempting to deal with the "rapid publication from existing material of maps partly of a provisional nature, incorporating the National Grid, on the 6 inch to the mile and smaller scales." In doing so I propose to deal in most detail with the oldest and youngest members of the family: the One Inch map, born in 1801, severely wounded by enemy action in November 1940, but now emerging from hospital, and the 1/25,000, born in December 1945.

The 1/M map in the style of the International Map is being revised and will be ready in two or three months in the same style as that used before the war, except that the National Grid with lines at 100-kilometre intervals will be superimposed. The grid has been inserted by computing the points at which it cuts the graticule lines and joining them by straight lines. The resulting lines, although theoretically forming parts of a curve, connect up without any apparent discontinuity.

The Ten Mile map has not yet been put in hand, but as a temporary measure use can be made of the 1/625,000 map prepared as the base of a series of maps which are being published for the Ministry of Town and Country Planning. Each of the maps in this series illustrate some particular feature, such as Roads, Railways, Administrative Areas, Land Utilization, and Population Density. In particular, the road map will be issued in place of the old Ten Mile road map, for the present at any rate, and, like that map, will have a special edition with Ansell fold. These maps compiled by the Ministry of Town and Country Planning form a most interesting series, but as the Ordnance Survey is only responsible for their publication, not for their compilation, I must leave them with this brief reference.

It may be noted here that the sheet line system of the 1/25,000 map, which will be described later, is based on the grid, each sheet covering one of the

10-kilometre squares on the 1/625,000 map; consequently the latter is a complete index to the 1/25,000 map.

The Quarter Inch map is being republished in the same form as before the war, except that the pre-war grid at 10-kiloyard intervals is being replaced by the National Grid at 10-kilometre intervals and revision carried out before and during the war is being incorporated. Difficulties have arisen in republishing this map owing to the destruction of all our original negatives by enemy action. As I shall be speaking of the measures taken to deal with a similar situation in the case of the One Inch map, I will not refer to this again. During the war an edition of the Quarter Inch map incorporating the Military Grid was produced for the Services. This map has been put on sale to the public, but is being withdrawn as fast as the new edition incorporating the National Grid can be produced.

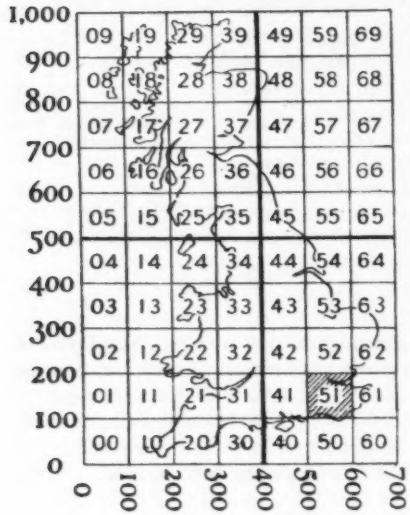


Figure 1

The One Inch map

In order to understand the steps which are being taken to publish a map covering the whole of Great Britain on the 1 inch scale as quickly as possible, it is necessary to recount a little history. In 1939 the map current over the greater part of England and Wales was the 4th, or Popular, Edition. This map had been prepared from the earlier Small Sheet series, which had been engraved on copper. The Popular Edition, which was designed on new sheet lines, was produced by riveting together duplicates from the copper plates of the Small Sheet series, taking transfers, and laying the work down on stone. The stones became the originals of the Popular series and were revised as necessary. Printing was carried out from zinc plates duplicated from the stones. In the course of time the stones were becoming unsuitable for further revision.

In 1931 the first sheet, the Plymouth sheet, of the 5th Edition was produced by drawing for heliozincography on Whatman's drawing paper at a scale of 2 inches to the mile for half reduction during the photographic process. The style of the 5th Edition was described to and discussed by this Society at the time. Its most notable innovations were the introduction of a grid spaced at 5-kiloyard intervals and the special care taken to design all the drawing to be suitable for reproduction by heliozincography. This last feature was specially noticeable in the style in which the names were written. A number of sheets of this series were produced covering a considerable area in the south of England.

The decision of the Departmental Committee to adopt the international metre as the basis of the grid led to the redesign of the sheet lines to conform to the new grid lines. The production of the 5th Edition was accordingly stopped and the production of the 6th, or New Popular, Edition was started. The style of this map was almost identical with that of the 5th Edition, the only changes being the change in sheet lines already mentioned, the use of a grid spaced at 1-kilometre instead of at 5-kiloyard intervals, and the removal of the black symbols denoting woods, leaving the green tint clear. The hill shading plates had already disappeared from the 5th Edition after a brief period during which the Relief Edition competed for public favour with the clear edition. The sheet lines of the area which had already been drawn and photographed for the 5th Edition were being changed by a new process which involved printing from the negatives by contact on to enamelled aluminium foil, reassembling the foils to the new sheet lines, and re-photographing. A further series of sheets was taken up for production on the new sheet lines using a new technique based on drawing on anodized aluminium foil.

In 1938, as political conditions were very disturbed, a programme was started for making prints from the negatives on zinc plates coated with white enamel as a safeguard against the possible destruction of the negatives. These prints on enamelled zinc were sent to Edinburgh. On the outbreak of war, work on maps of Great Britain stopped almost completely, but eleven sheets of the 6th Edition that were in an advanced stage were printed and put into store, as their issue to the public was forbidden by the War Office.

On 30 November and 1 December 1940, during the bombing of Southampton, the whole of our original records of this series were lost, including the new drawings on anodized aluminium. When the post-war programme was being considered, we had therefore none of the material which had been put into the production of the 6th Edition, except the stored copies of the

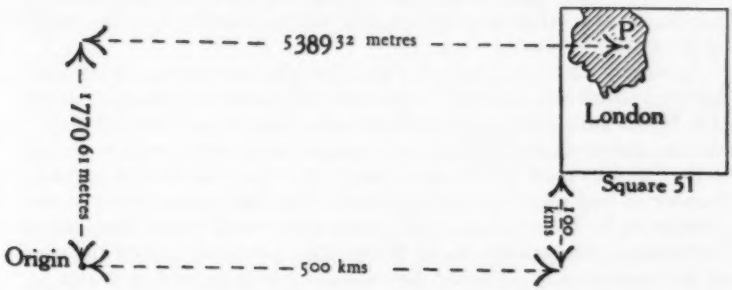


Figure 2

eleven sheets printed about the beginning of the war. The "existing materials" in the south of England were the enamel plates prepared from the negatives of the 5th Edition. In the north we had the copper plates of the Popular Edition, which had not been revised since their first production twenty-five or more years before, and some worn-out lithographic material which, but for the war, would have been replaced by a redrawn map. Our mandate was for

rapid reproduction from these materials. The methods to be adopted were controlled by the shortage of highly experienced staff, many of whom were still serving with the Armed Forces.

We are working to a plan. In the south of England we are reconstituting the 6th Edition by photographing the duplicate enamels of the 5th Edition and changing the sheet lines once again to those of the 6th Edition. We are incorporating all the revision carried out by Army Survey Units during the war and a special revision carried out on the Six Inch scale for A.R.P. purposes in 1938, which has not hitherto been made generally available.

It is unnecessary to describe this map in detail, as it is derived from the 5th Edition, whose style is well known. The principal novelties are as follows. The size of the sheets has been standardized so that each covers 45 kilometres from north to south and 40 kilometres from east to west. We believe that, at this scale, it is desirable to maintain a uniform size. There are also strong arguments for making the sheet lines conform to an exactly regular layout, as was done with the Small Sheet series. We think however that in a country of the size of Great Britain, with its indented coast line, this is more than counterbalanced by the advantage of fitting the sheets to the topography even though this leads to an irregular layout and to the use of overlaps between some of the sheets. The adoption of this system has also reduced the number of cases where special composite sheets are required to cover particular districts. The choice of size and shape for the sheets was influenced by the advantage of being able to use the "Bender" fold, which enables any part of the map so folded to be inspected without unfolding the whole map. The National Grid is shown at 1-kilometre intervals. It is unfortunate that, at this scale, the kilometre should be rather a small interval, while 10 kilometres is so large as to make sub-division by eye difficult. A compromise has accordingly been sought by which the lines at 10-kilometre intervals are solid while those at 1-kilometre interval are dotted. It is hoped that while making it possible to use the lines for reference purposes, this will not interfere with the legibility of the map.

As already stated, the method of showing relief on the original 5th Edition has been abandoned, as it was found to be unpopular with the general public. The black symbols indicating woods have also been cleared from the map. On the first sheets of the 6th Edition the contours were shown in the same colour as the "B" class roads for the sake of economy. After consultation with a large number of map users, it has been decided that this orange colour is not so satisfactory for the contours as the brown colour used on the One Inch map of Scotland. Accordingly, on all future maps produced and on the reprint of the maps already published the contours will be printed in brown.

In addition to the coloured edition of this map, an outline edition is published in which the detail and water are both printed in black. The woods that appear in green on the coloured edition are shown in grey on this outline edition.

In the north of England the delay involved in redrawing the whole map would be quite intolerable, and we are therefore publishing a Provisional Edition on the 6th Edition sheet lines. This edition can be replaced sheet by sheet by a redrawn edition when this seems desirable. The method employed

is to use the original copper plates of the Popular Edition, which are however in some measure distorted, possibly owing to the joining up of the plates by riveting or to the fact that the pressure in the press squeezes out the copper. The copper plates are photographed using a special system of lighting which gives excellently sharp results. A black print is made on to aluminium foil and grid lines are drawn, controlled by plotting the points of intersection of the National Grid on the Popular sheet lines. These foils are then cut as may be necessary to make them fit an accurate grid printed down on to an enamelled zinc sheet. The work is then revised.

The Provisional Edition of the 6th Edition of the One Inch is consequently in the style of the Popular Edition although it is on the sheet lines of the 6th Edition. The main differences as compared with the 6th Edition proper are as follows. The black detail, and in particular the names, being reproduced from an engraved original, are in a different style and incorporate hair lines which are difficult to reproduce by lithography. The method of reproduction, which involves photographing the copper plates instead of using transfers, has greatly improved the reproduction. It will be noticed that black symbols are retained to represent the woods in addition to the green printing. The road classification, based on that of the Popular Edition, is slightly different from the one based on the 5th Edition. Parish boundaries were not shown on the Popular Edition; on the Provisional Edition they have been added as a separate printing in a firm grey line.

In Scotland the position is different. The Popular Edition was produced later than the edition of that name in England. It was drawn on Whatman's paper at a scale of 2 inches to the mile for reproduction by heliozincography. It may perhaps be described as a compromise between the styles of the English Popular and 5th Editions. It was intended to harmonize with the English Popular Edition, but modifications were introduced to make it more suitable for production by the new process. All the originals of this series were destroyed, but a complete set of duplicate enamels was stored at Edinburgh. These are in process of being revised and having the National Grid added. They are then being reproduced in the ordinary way. The loss of quality compared with the original material is small. As this map is an exact replica of the One Inch Popular Edition produced before the war, except that the 2-mile squares have been replaced by the National Grid, it needs no description.

1/25,000 *map*

This map is a new departure for the Ordnance Survey, although military maps at this scale both of this country and of foreign countries have been produced for the War Office.

After a study of all available maps at this scale, a design was produced with these main features. The map is in three colours: black, showing buildings hatched and shaded, outline of roads, railways, fences, and other usual detail, grid at 1-kilometre interval, and grid numbers; blue, showing streams, canals, and swamps, with open water shown by a stipple of the same colour; and brown, for contours and road fillings. "A" class roads are shown solid and "B" class by a broken line.

The sheet lines are designed as squares of 10-kilometre side. The number of each sheet is the National Grid Reference (to the nearest 10 kilometres) of its south-west corner. Consequently the maps at scales of 1/625,000 and Quarter Inch to the mile form complete indices to the series. The size of the sheets may be rather on the small side, but the margins have been designed so that any two or four sheets can be assembled together and will then form a map complete with all its marginal information.

We think it desirable at this scale to draw all roads below a certain width to a gauge. Street names are shown only where the streets are wide enough, when drawn to scale, to allow the names to be inserted. All fences and woods are shown in character by black symbols.

Bench marks are shown in open country only, and their heights are not given. This decision was taken not only because the heights tend to overcrowd the map, but also because the levelling information at present available cannot be expressed by simple figures without accompanying notes. We had not completed the transfer of levels from the Liverpool to the Newlyn datum in 1939 and since then our records have suffered some losses from enemy action, while many bench marks, particularly those on milestones, have been removed. Lists of bench marks indexed by their Grid References are being published, with notes about the datum upon which their heights are based. As relevelling proceeds, these lists will be kept up to date and can be used in conjunction with the 1/25,000 map.

The contours at certain intervals have been surveyed instrumentally. These are usually at 50 and 100 feet intervals, then at 100 feet intervals to 1000 feet, and thereafter at 250 feet intervals. The remaining contours at 25 feet interval are in reality form lines showing the shape of the ground. In built-up areas they are shown broken and represent the general shape of the ground before human activities interfered with it.

Copies of this map were sent to a number of societies and individuals who are interested in this type of map and criticism was invited. Many valuable suggestions were received, some of which it was not possible to incorporate in a revised design. For instance, I received the following criticisms by the same post. "The map is nearly useless because it is too generalized and does not show the correct shape of roads; what is required is a reduced 6 inch map." "The map is too full of detail, an enlarged One Inch is the ideal." However, with the help of criticism, the map was redesigned. The main change was the introduction of a fourth colour, made possible without appreciable extra ex-

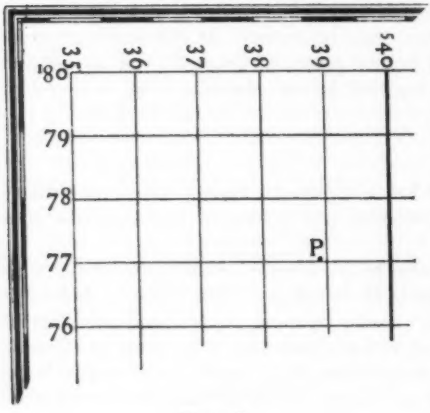


Figure 3

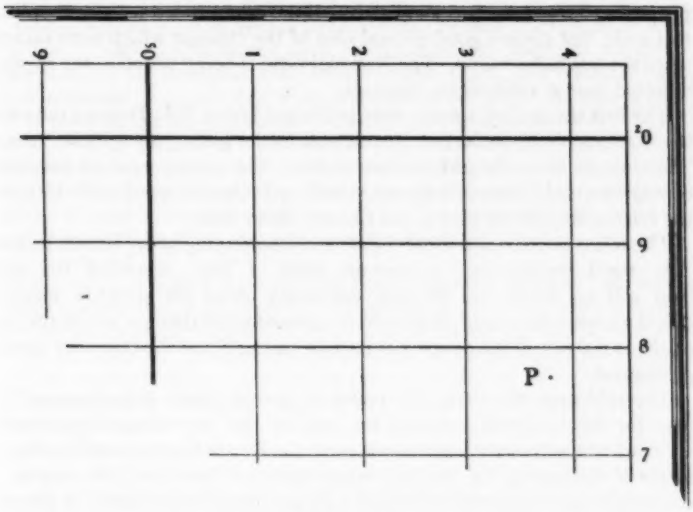


Figure 4

pense by the use of a new type of two-colour printing machine. The houses are distinguished by a grey filling with a slightly green tint; among other advantages this shows the public buildings more clearly, overcomes difficulties with small buildings, and enables the amount of generalization to be diminished in some measure. Woods and minor detail are shown in this colour, with a resulting emphasis on more important detail. An improved fount of type has been introduced. A minor improvement is the use of a mixed stipple of orange and blue to indicate mud.

The fully coloured map is being published in two forms: unmounted and flat, and mounted and folded in a case. In addition an outline edition is being issued, consisting of a combination of the black, blue, and grey of the coloured edition printed in dark grey. This is printed on a better class of paper than the coloured map and is intended to be used by those who wish to collect and record data. The fact that the same grid lines appear on this map and on the larger scales should make it easy to cross-reference in any particular area where more intricate data require recording on a larger scale.

Six Inch map

A description of the Six Inch map will, in future, appear in the Ordnance Survey Medium Scale pamphlet with the 1/25,000 map. No further progress has been made with the design of the new map described in the Departmental Committee report. The map will not appear for some years, as it will be made by reduction from the new large-scale survey.

Meanwhile a Provisional Edition is being published on the old county sheet lines. This map incorporates a hasty revision of built-up areas which was carried out in 1938 and issued only for the use of Local Authorities for A.R.P.

purposes. This revision does not give all the minor detail usually supplied at this scale, but gives a good general idea of the changes which have occurred since the last full revision. The National Grid is being added to the sheets by a dotted line at 1-kilometre intervals.

The first sheets of this series were published before V.E. Day at a time when the National Grid could not be released to the public for security reasons. These sheets show the grid but no numbers. The numbers can be inserted by comparison with County Diagrams, which are being published and which show the relationship of the grid to the County Sheet lines.

The terms of reference which I gave at the beginning of my lecture included "the rapid publication" of certain maps. I have described the maps. You will no doubt like to hear something about the progress made. If this does not seem rapid, it should be remembered that we are in the same plight as the rest of the country as regards our staff and the turn over to peace production.

The 1/M map, the 1/625,000 road map, and all sheets of the Quarter Inch map for England and Scotland are well on the way towards publication, although of the Quarter Inch only sheets 11 and 12 in England are as yet in the hands of the public. In England twenty sheets of the One Inch map in the south-east have been published and a further forty are in hand. In Scotland twenty-five sheets have been published and forty-four more are in hand. It is hoped to complete the publication of the whole of the One Inch map within a year from now. The new 1/25,000 map comprises two thousand seven hundred sheets, of which only three are ready for publication, about two hundred are drawn or on the drawing tables, and about seven hundred are in various stages of compilation. Uncertainties about staff make it unwise to prophesy about progress with this map.

DISCUSSION

Before the paper the PRESIDENT (The Rt. Hon. LORD RENNELL OF RODD) said: As Director General of the Ordnance Survey, Major-General Cheetham is here to describe to us the main lines of the post-war programme upon which the Survey has embarked. That programme is largely governed by the Final Report of the Departmental Committee published shortly before the war, and this Society was one of the bodies which submitted evidence to that Committee. There will, I hope, be a lively discussion following the paper, as the subject is, I gather, controversial, and controversy is always welcomed in this Society.

Major-General Cheetham then read the paper printed above, and a discussion followed.

The PRESIDENT: I have to express the regret of Sir Charles Arden-Close and Brigadier Winterbotham for inability to be present this afternoon. It seems appropriate to begin the discussion by reading some controversial remarks by both these absentees. Sir Charles writes:

"Most of us think that the recommendations of the Departmental Committee on the Ordnance Survey were generally sound, particularly those which advocated the retention of the old scales, the addition of a map on the scale of 1 : 25,000, and the adoption of one uniform, orthomorphic projection for the maps of Great Britain. As to the use of a grid, this has some advantages, but its

use requires care. There is a division of opinion on the choice of a kilometre grid; there is something in its favour and something against it. It rather obliges the public to make use of metric units on a non-metric map, but we could swallow that if it can be drawn so as not to spoil the maps. The National Grid on the Provisional 1 : 25,000 sheet is quite unexceptionable and the type of map seems to me to be excellent. The same remarks apply to the new 1 : 1250 plans, and I believe that the interval chosen for the grid on the Half Inch map is satisfactory. But the kilometre grid on the One Inch map does seem to me to injure what is otherwise an excellent map; it gives one the impression of looking at a landscape through a close grating. If only the kilometre divisions could be marked round the margins and the lines drawn across the maps, say at 5-kilometre intervals, all would be well."

Brigadier Winterbotham is perhaps less complimentary. He says: "My views on things concerning present policy in our small-scale maps are not over complimentary and have been published in the *Empire Survey Review*. I think it is a mistake to subordinate shapes and sizes to a grid which only interests the few, to omit tree symbols and so leave one ignorant of deciduous or non-deciduous, and to put grid-lines five-eights of an inch apart over that most valuable of all maps, the One Inch."

Dr. E. C. WILLATTS: Some of us who use maps more than others very much welcome the new series which are being brought out. Perhaps the 1 : 25,000 is the most controversial. Personally I like it very much. It is not intended to replace the Six Inch map, but to satisfy those for whom the Six Inch is too large and the One Inch too small. Though I am impatient to see this map out for all to use, I do not regret the care and the consequent delays that attend its preparation. I have had the privilege of seeing it in some of its early stages and I found the production most excellent. A number of features which hitherto have been rather too prominent have been subdued, and a map has been produced which will be useful for all those who need a general map of their district or a map on which they can plot additional information.

I do not agree with a former distinguished Director General that the One Inch map gives one the impression of looking through a lattice window. It is useful to be able to find the grid on the map and the use of the fine dotted line makes it fairly subdued, nor do I think we need fear confusion with footpaths. The one thing I regret about the One Inch is that it now ceases to distinguish types of woodland, although there is compensation in clarity.

Professor L. DUDLEY STAMP: I should like to say before this Society what I have already said to General Cheetham in writing, and that is that I feel it is a pity we have committed ourselves to a National Grid. Having striven so long to get the meridian of Greenwich recognized as the primary world meridian, and in these days when we tend so much towards internationalism, I feel that the adoption of a National Grid is a retrograde step.

No reference has been made to a very useful map which we have been using in the last two or three years: the Provisional Edition of the 1 : 25,000 map. I imagine that the Director General did nor refer to it because, from the technical point of view, he may not be very proud of it: it was photographed down from the Six Inch map and has two lots of contours which do not always coincide. But in the Ministry of Agriculture we have adopted that map and found it immensely useful. Roads are shown true to scale, so that the fields are accurate in shape and area—an important point from the agricultural point of view. This has been lost in the new 1 : 25,000 map, and the standardization of roads is therefore one of the features I regret.

In one important respect the new 1 : 25,000 map shows less than the One Inch

map. The One Inch map distinguishes classified and unclassified roads, and the best motor roads among the unclassified roads; the new 1 : 25,000 shows only the A and B roads, although details of transport are needed on these larger scale maps. This means that an unclassified road may be a good metalled surface which will take you anywhere or a quagmire which is quite impassable. I still hope it is possible to show on a map of this scale all roads with a metalled surface which can be used by wheeled traffic.

I should like to end by thanking General Cheetham not only for his very clear exposition this afternoon but also for the energy he has shown in developing the work of the Survey.

Professor S. W. WOOLDRIDGE: I think a word of gratitude should be said for the rapidity with which our old friend the One Inch map has come back into circulation. Map-users will agree with me that our lot was indeed forlorn during the war years, when we were, in effect, mapless, and I feel that gratitude is due to the Ordnance Survey and its Director General for rescuing us from that plight so early in the days of peace.

In regard to the grid on the One Inch map, this seems to me to be an excellent addition and no handicap whatever in reading the map. I submit that the dotted lines are an excellent compromise. In regard to the 1 : 25,000 map, I regret with Professor Dudley Stamp that it is not more nearly a small scale version of the Six Inch map.

No reference has been made to the prime need of the field scientists for a map on which they can exactly locate position—a need felt profoundly by morphologists. To-day I have had the privilege of seeing a singularly beautiful and perhaps unique morphological map produced by Mr. F. K. Hare on the basis of the 1 : 25,000 map. Without that base map he would have been faced with the task of reducing accurate morphological data from the 6 inch scale on which it was surveyed to the 1 inch scale. It is for such purposes as these that the 1 : 25,000 will be indispensable to scientific field workers. I hope that the term "provisional" does not forebode its supersession.

I am greatly intrigued by the mathematics of Professor Stamp's suggested International Grid. It does not seem to be generally realized that a rectangular grid is by its very nature "local" in application, and confusion in such a matter points to the need for the continued and extended teaching of elementary mathematical geography.

Professor DUDLEY STAMP: Why should not latitude and longitude be used for the same purpose?

Dr. H. L. RICHARDSON: From my own experience I have found the National Grid useful in identifying the site of a soil sample and in locating a field experiment with sufficient accuracy for somebody else to go back and take the experiment up. That would be more difficult on a latitude and longitude grid. Personally I welcome the metric grid, and I am glad to see the end of the old 10,000-yard system. For instance, on the Quarter Inch map the scale was given in miles and, I think, in 8000-yard units, the squares on the map in 10,000-yard units, and the decorations around the edge in degrees and minutes, so that it was very hard to correlate them.

Professor C. B. FAWCETT: I should like to thank General Cheetham for his wonderfully clear exposition, without which those who have not studied the matter in detail would find difficulty in following. In particular, his exposition of the National Grid is the clearest that I have heard.

Mr. DENNY: I should like to pay tribute to the excellent job that the Ordnance Survey have made of revising these maps. At the same time I find myself joining the critics of the National Grid as represented on the 1 inch scale, because it

tends to obscure some detail, especially in built-up areas. I wonder whether the solution would be to print the grid in another colour, although this would involve extra expense and 100 per cent. registration.

Major-General G. CHEETHAM: I think the answer to the various criticisms in regard to the National Grid would have been clear if I had not been dealing only with small and medium scale maps. The great value of the grid is that it applies also to large scale maps and to survey data. One objection to an International Grid is that this happens to be an island and therefore one of the few parts of the world which can have an isolated survey. I agree that methods such as have been used by the Germans, who have a series of six or seven overlapping grids for Germany alone, introduce all sorts of problems. But this country can be covered by one grid on which surveys on even the largest scales can be carried out by simple methods, and the whole area can be treated as a flat surface, except for two very simple adjustments. For a country of this size therefore it is preferable to work on a grid rather than on the graticule. I believe that various methods of decimalizing latitude and longitude are being worked out, but even if a universal international graticuled grid (or whatever you like to call it) is produced, it still will not be better for this country when taken by itself. In any case, that system has not yet been perfected, and if we wait for it I am afraid none of you will have any maps for a long time.

There is a good deal to be said for giving additional information about roads on the new 1 : 25,000 map, as proposed by Professor Stamp, but I am afraid it is impracticable at present because we have not the necessary information, and the present edition is being produced from available material as quickly as possible. As to showing the character of woodland by black symbols on the One Inch map, that is a matter of opinion. It was decided against showing them some little time ago; earlier it was decided in favour of showing them. As a result, the One Inch map of England will have wood symbols shown in the north and not in the south. When we produce the new re-drawn edition, the matter will come up for consideration, and will no doubt be sent out for criticism to a large number of people, as with the maps already produced.

The meaning of the word "provisional" in regard to the 1 : 25,000 map is that this has been re-drawn from the existing Six Inch map and is not a re-survey. I am a little afraid that in certain parts of the country the errors which are beginning to creep into the large scale plans owing to continued revision may have some slight effect even on the 1 : 25,000 scale. The final edition of this map will be a reduction from the new survey. Another reason for using the term "provisional" is that the contours will almost certainly be re-surveyed and, as I explained earlier, a large number of the contours shown on the 1 : 25,000 map are in fact form-lines. I hope that on the final edition they will be surveyed contours. There is however no intention of withdrawing the map, except as it is replaced sheet by sheet by the final edition.

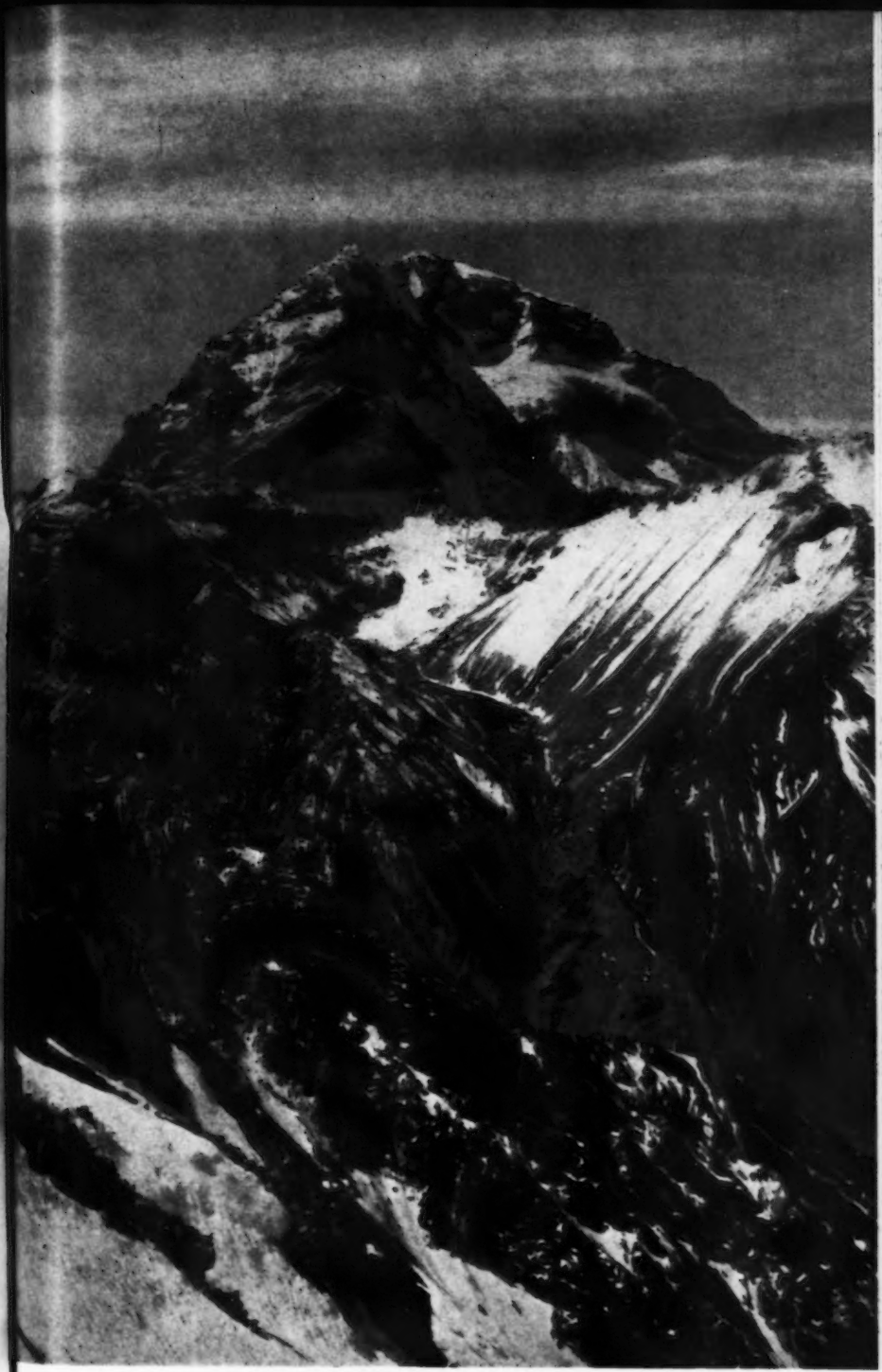
The PRESIDENT: The impression which is left on my mind is the extraordinary difficulties under which General Cheetham and his staff have been working. I am sure you will all wish me to thank General Cheetham for his very clear presentation of his subject and to express your appreciation of the efforts that the Ordnance Survey have made to meet not only public opinion but also expert opinion in the face of the many differing opinions that have been expressed.

Major-General M. N. MACLEOD, *who was unable to attend the meeting, sends us a written contribution to the discussion:* I am very sorry that I could not be present to hear General Cheetham's paper, but he has kindly sent me a copy and I should like to be allowed to comment on one or two points in which I am especially interested. First, the method of giving grid references. I do not sup-

pose that any one with experience of map grids doubts their value, but I do not think any one can yet predict how far their use will develop. The method of giving a map reference explained by General Cheetham is, I believe, based upon the method used in the Army, and in these troublous times it is clearly desirable that the system used in the Army should be the same as that used in civil life. Were this not so, I myself would have preferred that all grid references should conform to the single and simple rule that "All grid references consist of an even number of figures whereof the first half represents easting and the second half northing," leaving the precision of the reference to be indicated by the number of figures unless otherwise stated. This rule would avoid the use of oblique strokes and arbitrary rearrangement of the sequence of the figures. Under this rule the references 41/1429 and 41/142295 would be written 414129 and 41421295, both of which appear to me to be more compact than a form in which an oblique stroke has to be inserted. The O.S. method is perhaps better suited for abbreviation, but I believe that the most convenient abbreviations will only be found by experience.

The second point on which I should like to comment is the design of the new 1:25,000 map. This scale seems to me to have two special attributes which should make it a particularly useful one. The first is that the grid square is exactly the same size as that on the "basic" 1:2500 plan, which makes it especially convenient to use these two maps in conjunction. The second is that 1:25,000 is about the smallest scale on which it is possible to avoid deliberate exaggeration of certain features, such as the widths of roads; and on which therefore everything can be shown exactly in place. The emergency edition of this map, hurriedly produced during the war, proves, I think, that practically everything now shown on the Six Inch map can be shown on the 1:25,000 scale without serious loss of legibility, and, of course, in a much handier form. I think that there should be as little "generalizing" as possible. To make this map little more than an enlargement of the One Inch would be, in my view, to lose one of its most valuable attributes.

Finally, I should like to add that although, as General Cheetham says, the Report of the Davidson Committee has been discussed by the Society, the discussion took place six years ago, and under the shadow of impending great events. One of those events resulted, I believe, in the destruction of the whole of H.M.S.O.'s stock of the Report within a year or so of publication, and long before the contents can have got into the hands of the public. There may be critics of O.S. changes who have not yet heard, or who have forgotten, the reasons for them. I hope that it will be possible to get the Report reprinted and placed on sale again at an early date, and at its original price.



Phots. Arthur B. Emmons

Aconcagua from the summit ridge of Tolosa

North east face of Tolosa

Summit ridge of Tolosa

North-east face of Tolosa

Summit ridge of Tolosa

TWO CLIMBING EXPEDITIONS IN THE CENTRAL ANDES

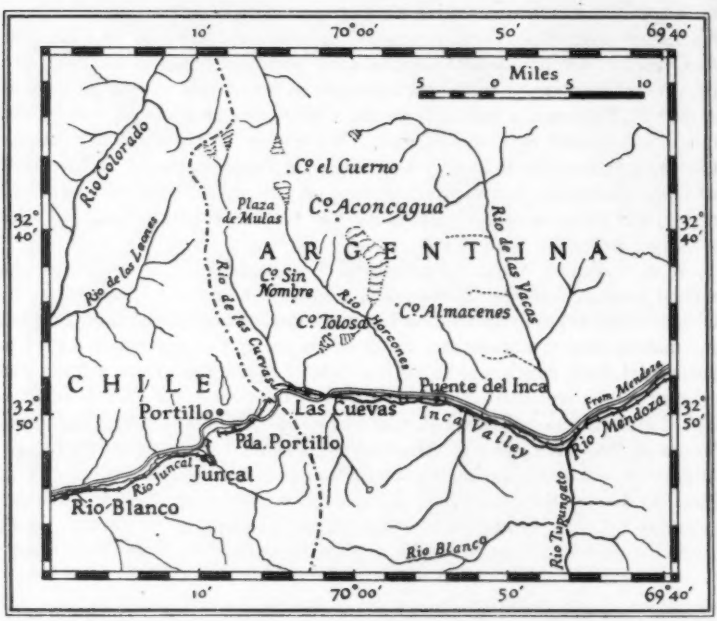
T. CROMBIE

IN 1937 I PAID a brief week-end visit to the Chilean ski-ing resort of Portillo, on the Transandine Railway, and this introduction to Fitzgerald's "Highest Andes" bred in me a determination to return one day, and to become better acquainted with a region which seemed to offer such fascinating possibilities for climbing and mountain exploration. In 1944, after four years in Montevideo, the opportunity presented itself in the form of a two-weeks' vacation. I was most fortunate in being able to join forces with Arthur B. Emmons, a colleague in the United States Embassy with a distinguished record as a mountaineer. We got in touch also with Miguel Cáfaro, a meteorologist in the Argentine Air Force stationed at Mendoza, who was anxious to join us in an attempt on one of the smaller peaks of the region, and who was able to supply us with some of the essential equipment which we lacked.

On 14 February 1944, Emmons and I arrived by air at Mendoza, the eastern terminus of the Transandine highway, where we were joined by Cáfaro. After three precious days had been spent in collecting food supplies and making final arrangements, we set off by car up the international road to Puente del Inca, which was to be our base of operations. Here a hotel and military refuge are situated near the head of the pass at an altitude of 8860 feet. Through the courtesy of the Commandant of the local Argentine Mountain Regiment, we were given quarters in the very comfortable refuge. At once we set about hiring mules to transport us and our equipment to Plaza de Mulas, the base camp of the various Aconcagua expeditions, and thence to a higher camp, from which we hoped to make an attempt on El Cuerno, a peak of 18,200 feet, adjoining Aconcagua at the head of the upper Horcones glacier. At the hotel we were confidently told that Plaza de Mulas was an easy day's trip from Puente del Inca, that we need not make an early start, and that, as a concession to our untrained condition, we might find it convenient to share a riding mule between the three of us. The inaccuracy of this information was to be made painfully clear to us on the following day.

On February 18, accompanied by a muleteer or *baquiano*, we started off at a leisurely hour up the Horcones valley, which joins the main Inca valley about a mile above the hotel. At the junction, we obtained a magnificent view of Aconcagua, rising at the head of the valley over 15 miles away. With this inspiring sight as a beacon, we made good time as far as the meeting of the two upper branches of the Horcones valley, where, for the second time that day, we were ferried one by one over the swift Horcones torrent on the back of our single riding mule. Beyond the junction, the upper Horcones valley broadens into a high flood-plain, flanked by savage cliffs and scree, and almost devoid of life. As the day wore on, the long grind up the interminable valley

floor began to have a serious effect on us, and the assurance of our *baquiano*, comfortably ensconced on his mount, that Plaza de Mulas was still several hours distant, made the outlook as gloomy as the weather had now become. By the time we approached the valley head, directly under the huge western cliffs of Aconcagua, the combined effects of altitude, cold, and lack of training had reduced all three of us to the point of exhaustion. We might never have arrived at our destination, had not a train of unloaded pack mules (belonging to the Link expedition which was then engaged in climbing Aconcagua) overtaken us near the snout of the upper Horcones glacier, and carried us up the final steep ascent to the camp. For the last two hours we were moving into



driving snow with the temperature at 25° F. It was 9.15 in the evening when we reached camp, 5000 feet above Puente del Inca, and 20 miles distant: not such an "easy day" as we had been led to believe.

At Plaza de Mulas we found three members of the Link expedition who had climbed Aconcagua the week before, and were now awaiting the return of the other six members of the party, including their leader, Juan Link, and his wife.

At Plaza de Mulas the storm raged intermittently for the next forty-eight hours, with high winds accompanied by driven snow—the dreaded *viento blanco* of the High Andes—and the temperature down to 10° F. Most of this time we remained huddled in our sleeping-bags for warmth, dozing fitfully, and listening to the wind tearing at our none too solid tent, through numerous

rents in which spindrift whirled in such quantities that we were soon covered in several inches of powdered snow. Late on the afternoon of February 20, when the wind had abated a little, we decided to beat a retreat. Fodder for the mules was exhausted, and the amount of new snow on the peaks made high climbing out of the question for the next few days. Regretfully therefore we abandoned our intention of ascending El Cuerno, now looming vaguely through the clouds, and took our leave of the three members of the Link expedition. They were still not unduly anxious about their leader and his companions, as they were confident that they would weather the storm safely in an elaborate plastic refuge which they had set up on Aconcagua at an altitude of 19,800 feet.

As we descended the valley, the weather improved to such an extent that we decided to set up a camp at the confluence of the two Horcones valleys, and next day ascend the lower Horcones glacier, which we knew must offer magnificent views of the great south-east wall of Aconcagua. After a very cramped night, we followed an easy route up an abandoned central moraine to the higher reaches of the valley, which is flanked on one side by the outlying buttresses of Aconcagua, and on the other by the great stratified cliff of Almacenes (16,200 feet) and its supporting ridge. After several hours' climbing, the curving valley opened out into a sweeping cirque, floored with the great ice seracs or *penitentes* which are a feature of Andean glaciers. From where we stood, at a height of about 14,000 feet, the south-east face of Aconcagua was exposed to full view. The tremendous rock wall, nearly 9000 feet high, falls away from the sharp summit ridges in a series of great precipices and hanging glaciers, which must surely constitute one of the finest mountain faces in the world. After we had feasted our eyes on these magnificent surroundings for several hours, the peaks became obscured by gathering clouds, and we returned to camp late in the afternoon. The following day was again clear, and, to take advantage of this, we ascended the western ridge of Almacenes to a height of about 13,500 feet, from where we obtained fine views of the whole extent of the Horcones valley and of the great bulk of Cerro Tolosa (17,800 feet) immediately opposite us.

On February 23 our *baquiano* returned to fetch us, bearing the news that of the Link party in the higher camps on Aconcagua, only two had returned to Plaza de Mulas, and that, as a preliminary search had failed to reveal any trace of the others, there was now little hope of their survival. Later search parties were equally unsuccessful, and it was not until some ten days later, after our return to Montevideo, that we learned that our friend Cáfaro had returned to Plaza de Mulas with two companions and had found the body of Schiller, a sixty-five-year-old geologist, lying outside the wreckage of a tent at 22,000 feet. Of Link and his companions there was no trace, and it was not until the following year that the mystery of their fate was partially cleared up, as will be related presently.

Our holiday was now at an end, and it was with regret that we turned our backs on the jagged cliffs and gleaming snows of this magnificent range. Bad weather and inadequate equipment largely accounted for our having accomplished so little. On the other hand, we had gained valuable knowledge of the topography of the Aconcagua region, which made us the more eager to

return the following year to make a better organized attempt on one of the lesser peaks which surround Aconcagua itself.

February 1945 found both Emmons and I still in Montevideo, and accordingly we agreed to give up our annual leave to a second expedition to Aconcagua. On February 9 I arrived with my wife at the Puente del Inca Hotel, where we were joined some days later by Arthur Emmons. On February 17, accompanied by Mario Pasten, a famous local *baquiano*, who has made two successful ascents of Aconcagua, Emmons and I set off once more up the Horcones valley, with the intention of climbing Tolosa by the north-west ridge. This was the route followed by Mervyn Ryan and his party in 1925,[1] as a preliminary excursion to their successful ascent of Aconcagua in the same year. This time, mindful of our unfortunate experience in 1944, we made sure that we had a riding mule each, and an assortment of high-altitude equipment, including enough tents for both a base camp and a bivouac. After a ride of about four hours, we left the familiar Horcones trail and turned up a wide side valley which descends from the northern face of Tolosa. Here we found a good site for our base camp, in a scree hollow at an altitude of about 14,000 feet, commanding a magnificent view of the western cliffs of Aconcagua on the opposite side of the main Horcones valley. Pasten and the mules took leave of us, and we set about pitching the larger tent and making ourselves as comfortable as the barren surroundings and cold nights would permit.

On the following day, after a reconnaissance of the valley head and the lower part of our route, we decided to set up a bivouac on the scree slopes leading to the north-west ridge of Tolosa. This necessitated an exhausting grind with heavy packs up the moraine and snow slopes, accomplished only after some delay caused by intermittent snow and high winds which for a time drove us back to the base camp. We spent an uncomfortable night in our tiny bivouac tent, perched on a narrow ledge jutting out from the steep rock face, but next morning the weather had improved, and we set out early up the steep scree and broken slopes which lead to the north-west ridge of Tolosa. Ryan had described the route in detail and, apart from its length and the possible effects of altitude and weather, it had not appeared to offer any serious difficulty. But we had reckoned without the deep fresh snow which, as the result of an unprecedented summer storm and the prevailing westerly winds, was lying on slopes which are normally free from snow at this time of year. After about six hours of plodding over soft snow, in which at times we sank up to our shoulders, it became clear that our chances of reaching the summit that day were slight. But we determined at least to reach the crest of the ridge and to take a look down the western side of the mountain. At about 1.30 p.m., after a steep scramble over loose rock—the bane of climbing in this region—we gained the crest of the ridge at an altitude of about 16,700 feet. We were still over 1000 feet below the summit, and nearly a mile distant from it in a horizontal line, but the magnificent view of Aconcagua on the one side, and the Chilean peaks merging into the Pacific coastal plain on the other, afforded us some consolation. We were also encouraged to observe that much less snow was lying on the north-west face, so that an ascent from the Cuevas valley appeared feasible. Further progress up the rock walls of the ridge from the

[1] "Ascent of Aconcagua," *Geogr. J.* 66 (1925) 44–6.

Base camp I, and Aconcagua from the west

Bivouac on the north-east slopes of Tolosa

Looking south down the moraine of the Horcones glacier

Ascending the Horcones valley

Base camp II, and peaks on the Argentine–Chile frontier

point we had reached was impossible, so we descended to the bivouac, and next morning returned to the base camp, where Pasten and the mules were already awaiting us. On the way down to Inca, we were surprised and pleased to meet Cáfaro, our companion of the previous year, who had promised to join us but had been "unavoidably detained" when the time came.

After two night's rest in the luxury of the Inca Hotel, we set out again, now three in number, to make a second attempt on Tolosa from the western or Cuevas valley side. Our route followed the railway as far as the Argentine entrance to the Transandine tunnel at Las Cuevas, where we turned off to the right and skirted the south-western buttresses of Tolosa. We set up our camp on the snow-covered moraine at the base of the north-west cliffs, at approximately the same altitude as our previous camp, but on the opposite side of the high col between Tolosa and the Cerro Sin Nombre. From this point the north-west face of Tolosa appeared as a huge foreshortened mass of rock walls and gullies, so that the choice of a route was not easy. The weather however was now set fair, and at six o'clock on the following morning we struggled out of our sleeping-bags and, after the customary battle with the Primus stove, began the ascent of a zig-zag route up snow slopes which we had planned on the previous day. In marked contrast to the soft snow on the lee slopes of the mountain, the snow here was firm and frozen by the wind, and the going, though steep and tiring, was not difficult. Nine hours' steady climbing, which involved several descents into gullies and much rock scrambling, brought us out on to a broad plateau of *névé* below the summit ridge, the highest point of which was out of sight at some distance to the south. On gaining the crest of the ridge, a magnificent prospect of Aconcagua and the central Andes was opened to us. The great Statue of Christ could just be seen as a mere speck at the head of the Transandine pass far below. The view to the east, down to the valley up which we had toiled the week before, was particularly impressive. At 5.30 in the evening we reached a rocky pyramid on the ridge, beyond which an enormous cleft completely cut us off from the southern summit of the mountain. As we had understood this to be the highest point of Tolosa, and the lateness of the hour made it quite unattainable, we again resigned ourselves to failure. Our spirits rose therefore when, on scrambling to the top of the pyramid, we discovered a bottle containing papers left by the 1941 Argentine Aconcagua expedition. Although they had climbed the Horcones face, from which the southern summit of Tolosa is more accessible, they had evidently chosen the pyramid on which we now stood as the highest point. This, we afterwards learned, was the result of careful instrument reading.

Having joyfully accepted the opinion of such experts, we began the descent, hoping to reach the foot of the mountain by one of the big gullies we had seen from our base camp. We chose the wrong gully however and were forced to traverse out of it on a steep rock face. Darkness overtook us while we were still high up on the mountain side, with steep and unfamiliar ground below us. Fortunately the night was fine and comparatively warm, with the prospect of a full moon later. Nevertheless, we passed some anxious moments, and were grateful for the skill and experience with which Emmons groped his way down and guided Cáfaro and myself after him. For the first four hours we made painfully slow progress in almost complete darkness, with long cold

waits between moves; but at length we reached easier ground, the moon rose over the shoulder of the mountain, and we knew we would make camp that night. It was two o'clock in the morning when we eventually reached our tent, after nearly twenty hours out on the mountain side. During that time we had explored a new route on a mountain which, considering its accessibility, is remarkably seldom climbed.

After we had rested a day in the camp, Pasten came to fetch us with the mules, and we returned to Puente del Inca. Here we learned that, three days before, the Argentine Army expedition had climbed Aconcagua, and had found the bodies of Link and his wife 250 feet below the highest point, where they had apparently collapsed after reaching the summit. Of the last member of the party still unaccounted for no trace was found. Most of the expedition had already returned to Mendoza, but we learned with amusement that the Commanding Officer of the Regiment, warmed no doubt by the champagne with which my wife had toasted the returning Argentinians in our absence, had given orders that "in the event of an accident to the Tolosa expedition, the cost of a search party and any funeral expenses would be borne by the Argentine Government." Needless to say, my wife was relieved that this generous offer did not have to be implemented.

TURKISTAN IN TRANSITION

H. E. ADLER

This paper was written in 1944 and has not been revised. The author wishes to thank Mrs. J. A. Steers for her help in preparing the manuscript

BETWEEN THE eastern shore of the Caspian Sea and the mass of highland in Central Asia lies the region known as Turkistan. It is crossed by two great rivers, the Syr Darya and the Amu Darya (the Jaxartes and the Oxus of classical fame). Both now run into the Aral Sea, the Syr Darya having its source in the Tien Shan ranges and the Amu Darya rising farther to the south-west in the Hindu Kush mountains. Since the Bolshevik Revolution, Turkistan has been divided into the five republics of the Uzbek, Turkmen, Tajik, Kirgiz, and Kazakh peoples.

Physically and structurally, Turkistan is divided into two. The western and greater part is lowland, a southward continuation of Kazakhstan, but to the east and south-east the country rises to mighty ranges which include the great peaks of Mount Stalin and Mount Lenin. In Tertiary times the whole of Turkistan was submerged, and this is evident in the landscape features of the west and centre. In the mountainous east the most conspicuous land-forms derive from much later glaciation. Boulders and rubble have been shifted by glaciers and streams, and strewn alike over the Hercynian Tien Shan ranges with their wide depressions and the Tertiary Pamir-Alai mountains with their deep, precipitous, river gorges.

In the region as a whole therefore, the environmental settings for human activity are sharply contrasting. In the lowland west are the huge deserts of Kara Kum and Kizil Kum, together forming one of the great arid areas of the world. Of the two, the Kara Kum, lying to the south, is the more formidable, with vast expanses of wind-formed ripple ridges and, to the east, the gigantic crescent-shaped dunes or *barkhani* sometimes rising to more than 30 feet. In both deserts, according to the findings of geographers and archaeologists and the fragmentary comments of travellers through the ages, desiccation is on the increase and the possibilities of human settlement and exploitation were shrinking until political change and the impact of modern science brought about an abrupt transformation in land use and an awareness of mineral wealth. John de Plano Carpini, the Franciscan traveller of the mid-thirteenth century, reported that "in this country we found innumerable cities with castles ruined and many towns left desolate." In the Kizil Kum the writer noticed simple cubes with cupola roofs standing on some of the dunes; these are the burial places of holy men and chieftains, which form landmarks visible for many miles around. Crumbling vaults and arches, the ruins of splendid mosques, are scattered about in this limitless sea of sand and dust like nut-shells crunched under a giant heel.

Away to the south-east and in impressive contrast lie the mountain republic of Tajikstan and the highland part of the Kirgiz Republic. In Tajikstan, the appearance of the Galcha tribes surprised Benedict Goes, the Jesuit traveller of the early seventeenth century, especially their "yellow hair and beards like Flemings." Franz von Schwarz, the German scientist, who worked at the Tashkent Observatory some three centuries later, was equally interested, but his reflections took the form of an attempt to establish the racial affinity of the "yellow-haired," an example of German obsession with the idea of an Aryan race. The Tajik tribes indeed stand apart from the majority of inhabitants of western Central Asia. Their physical appearance has struck many travellers, they speak an Iranian tongue distinct from the Turki of the majority, and they continue to practise, largely undisturbed, the self-sufficient mixed farming of high altitudes. Neither the activity of nomad warriors in the past nor that of the Slavs in more recent history has affected at all deeply their farming, their customs, or their paganism. Remote as yet, they move between the high-level, stone-built villages of the alpine pastures and the lower-level, winter settlements, watered by icy rivers, where cultivation is possible. The main transformation in landscape and economy has taken place farther west.

On the edge of the highlands, between the two extremes of remote mountain and repellent desert, lie the oasis cities, famous in the history of commerce. North-east of the main stream of the Syr Darya in the valley of the Chirchik stands Tashkent, now the greatest city in Central Asia. To the south-west, in the valley of the Zeravshan,[1] are Samarkand and Bukhara. South-west again is Merv in the valley of the Murgab. These are the outstanding centres in the ribbons of intensive cultivation and close settlement which follow the shallow,

[1] The amount of water used by the irrigation schemes (see pp. 233-4) is so great that the stream of the Zeravshan is now reduced to a thin trickle, which disappears in the sands about 20 miles from the Amu Darya.

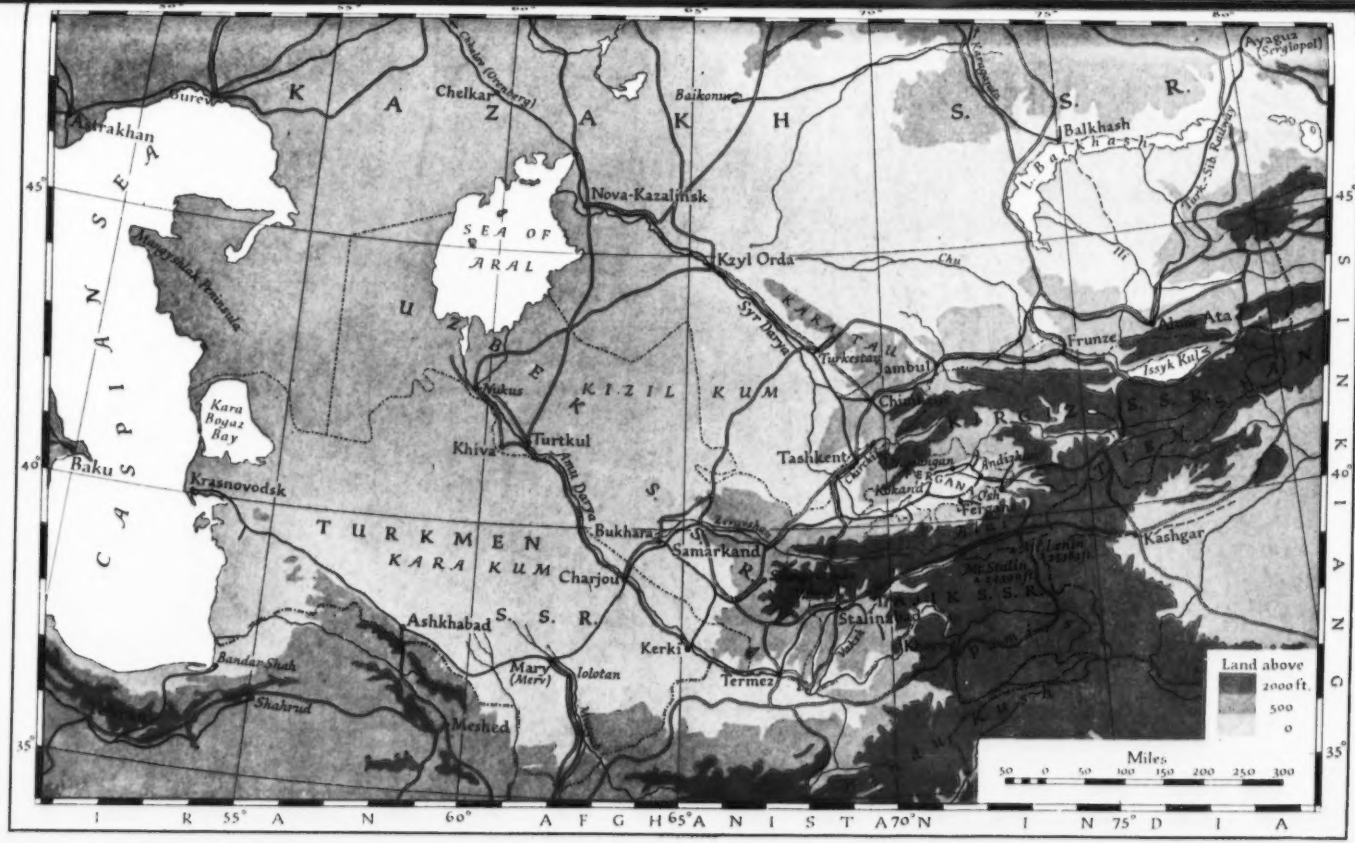
silt-laden rivers and branching canals of this vast inland drainage basin. Many of these ribbon oases border the mountains, but many also stretch in green threads across the grey and yellow sand of the desert. The fertile loess soils and high temperatures have stimulated flood-farming, which has here been continuous from generation to generation both for subsistence and for exchange. But the tiller of the soil has his problems, not least of which are the hot, dry, withering winds of summer (*garmsyl* and *tebbab*, the "fever wind") and the sand-storms which fill the air with fine yellow dust. Like the oasis cultivators, the caravan merchants have existed here for centuries, carrying on a precarious and fluctuating trade across the highlands to the east and south and the deserts to the west. The furs of Siberia, the alluvial gold of the rivers of Central Asia, the semi-precious stones of the mountains, and the silk and tea of China changed hands in the oasis towns of Turkistan, and in Bukhara in particular.

The caravan trade, of course, touched the pastoralists of the lowlands and foothills. Distinct from the mountain farmers and the oasis cultivators, the pastoralists formed the third group of peoples living on the land. Sheep and cattle, camels and horses have been reared on the steppes and foothills of Turkistan from time immemorial, and the Kirgiz horse-breeders have a particular interest in the trade routes.

In lowland Turkistan, until the twentieth century, an interesting balance was maintained between the nomad on the one hand and the tiller and merchant on the other. In the steppes of Central Asia, nomadic warriors appeared and disappeared like dust-clouds, occasionally establishing political and military structures of real significance, like that of the Mongols, but more often enjoying a short phase only of conquest and destruction. Their prey and their sources of supply were the cultivators and merchant groups of the oases, who survived and absorbed one set of conquerors after another. Until the collapse of the imperial regime in Russia, the Emir of Khiva controlled northern Turkistan and the Emir of Bukhara the south. The tribal chiefs or Begs owed them both military allegiance and taxes in kind. It was a system which punished the cultivator and the pastoralist, especially when the Beg was hard put to it to collect his annual due of slaves, cattle, and silk. The "Ark" dungeon of the Citadel of Bukhara and the minaret Minar Khatan (the "tower of death") of the same city are evidence of the Emirs' long-established tyranny.[1]

Into this varied and unquiet society came the Slavs from the north-west. Soviet literature tends to suggest a sudden irruption in the twentieth century as part and parcel of the Bolshevik upheaval, and this is in one sense correct. The rule of the Emirs and the Begs, which had persisted under the Tsars, was swept away after the Revolution, and from the records of foreign technical experts who were employed in Turkistan during the implementing of the Five Year Plans (up to 1937), it would seem that economic change was no less drastic. Moreover, we are accustomed to regard emphasis on the more remote territories of the Soviet Union as characteristic of Russian economic history

[1] In 1841 Conolly and Stoddard, the envoys of the East India Company to the Emir of Bukhara, after being imprisoned for three years in the Ark, were flung down from the minaret 210 feet to the pavement below.


Ayaguz (Sergiopol)
Balkhash
Lake Balkhash
Turk.-Sib Railway
Baikonur
Chelkar (Orenburg)
Chelkar
Astrakhan
Guryev
Nova-Kazalinsk
SEA OF ARAL
Kzyl Orda
Chu
Syr Darya
KARA TAU
Turkestan
Jambul
Frunze
Alma Ata
Issyk Kul
Mangyshlak Peninsula
Kara Bogaz Bay
Mikus
KIZIL KUM
Khiva
Turtkul
Aral Tengiz
Tashkent
Chimkent
Andizhan
Kokand
Osh
Fergana
Baku
Krasnovodsk
Bukhara
Samarkand
Kashgar
TURKMEN
KARA KUM
Charjou
Ashkhabad
Stalinabad
Kerki
Termez
Mary (Merv)
Iolotan
Bandar Shah
Shahrud
Meshed
Land above
2000 ft.
500
0
Miles
50 0 50 100 150 200 250 300
CASPIAN SEA
SINKIANG
IRAN
AFGHANISTAN
INDIA
55°
60°
65°
70°
75°
80°
45°
40°
35°

Phots. S. I. B.

Cotton fields beneath the mountains of northern Tajikstan

Irrigation canal near Kurgan-Tube in Tajikstan

Power station of Varzobstroy, north of Stalinabad

of our time. What has been planned and achieved in Turkistan is akin to the spectacular developments in the Urals, and these eastward shifts in economic gravity are not difficult to explain.

But Russian interest in Turkistan preceded the Soviet regime by centuries. It was an off-shoot of the great Russian drift across Siberia, beside which the German *Drang nach Osten* pales into insignificance. The phase of military conquest began under Peter the Great with the object of subduing the fierce nomadic tribes to the south of the Ural Mountains, and it continued in the form of punitive expeditions for some two hundred years, bringing Russian influence to the borders of Afghanistan and China. Until the beginning of the twentieth century however it was largely a strategic enterprise, with a direct garrison control of a skeleton kind in remote Tajikstan to guard the frontiers, while the Emirs continued to rule the plains. The industrial growth of Russia in the early twentieth century explains a fresh interest in Turkistan, which has developed in our own time past all imagination. Before 1914 the extension of irrigation had begun, mainly to establish cotton production, and the Soviet authorities inherited something like $4^1/_2$ million hectares of irrigated land. Orenburg, in the steppes of European Russia, and Tashkent were linked by railway in 1905, and the track of the Turk-Sib railway had been surveyed. The Repetek Research Station for advising the cotton farmers was established in Turkmenia in 1912, and the textile manufacturers at St. Petersburg and Moscow were already looking to Turkistan as a more valuable source of supply for cotton than the sea-borne imports.

The increase of irrigation farming in Turkistan before the Revolution was achieved by an extended use of time-honoured methods. Flood-farming here is an age-old economy, but the technique is slow and laborious. The *aryks* or channels were multiplied many times by means of the traditional *ketmenj*, or long-handled hoe, and the higher fields were watered from earthenware jugs fitted to primitive wooden wheels. This development of flood farming by an amplification of simple practices continued until 1933.

The change in technique in the years before the present war was remarkable. The first new irrigation scheme affected the Vaksh tributary of the Amu Darya in Tajikstan at the point of its emergence from the Alai Mountains. Over long sections a new course for the river has been blasted out of the rock, and at the junction of the canalized stream with the power station the water passes through seven sluice gates and successive semi-circular spill-ways. Below the power-station its waters feed a wide network of narrow channels, so that a great stretch of arid steppe has been reclaimed. Between 1933 and 1938, 41,000 hectares were irrigated here for the cultivation of Egyptian cotton.

Even more important is the project for dividing the waters of the Amu Darya in its lower course. At Kerki, the point where the Tashkent–Termez railway approaches the river, part of the water has been diverted to the Uz'boy Channel, a deep dry valley running for several hundred miles through the Kara Kum desert and reaching the Caspian Sea near Krasnovodsk, the eastern terminus of the trans-Caspian railway ferry. This channel is a former bed of the Amu Darya. The sand dunes at Kerki, which had piled up for centuries and choked any inflow to the former channel, were levelled away,

and the hot sand of the channel, after a greedy absorption of the diverted water, became thoroughly saturated. The potentialities for agriculture in the scheme are remarkable. The course of the Uz'boy Channel is about 300 miles in length and the silt brought down by the Amu Darya is very fertile. Something like 1,250,000 hectares of former desert land are being reclaimed for farming. The great commercial crop is cotton, but drought-resisting plants like sesame are favoured, and *kendyr* (*Apocynum Sibiricum*), which is the raw material for hemp. Rice-fields and orchards for sub-tropical fruits are being laid out, and deciduous trees like willows, poplars, and almonds fringe the irrigation channels.

Farther north, in the basin of the Syr Darya, a third irrigation scheme has changed the landscape. The Fergana region is naturally highly favourable to farming, and ranks as one of the great natural gardens of the Old World. The flat valley floor is sheltered by the surrounding hills from the cold, dry winds of Central Asia, and is covered with a maze of irrigation channels outlined by rows of poplar and willow. The possibilities of farming have been much increased by the recent construction of the great Fergana canal, some 200 miles in length. Formerly the spring thaw led to a swamping of the eastern and upper part of the valley, while the western part lacked sufficient water. Now the run-off is distributed evenly, with a consequent increase of cotton and sugar-beet production.

In all regions of irrigation farming affected by shifting sand, the possibilities of binding the soil with fresh plant and tree growth need careful consideration. Sand-barley and sand-oats are useful crops for this purpose, but the most essential feature of afforestation is the *saksaul* (*Haloxylon ammodendron*), a stunted tamarisk very common in western Turkistan. The wood is hard as bone and in great demand for fuel, so that the depletion of the existing trees has been very severe. It is a slow-growing tree, but if grown from a shoot it matures about five times as quickly as if planted from seed, and by this method considerable areas have been reafforested.

To the original research station in Turkmenia, four others have been added. In Tashkent is the Nikhi Cotton Research Station, which is extremely important. Experiments in cross-breeding Russian cotton with Egyptian and American varieties, the introduction of rotation crops such as lucerne on cotton farms, the range and use of fertilizers, the control of pests, and the possibilities of new irrigation schemes are studied there. Moreover the staff, originally Russian, is now drawn increasingly from the local population, Kirgiz, Uzbek, and Tajik. Farther north, on the shores of the Aral Sea, is the Chelkar Desert Cultivation Station. The Iolotan station lies in the south-eastern extremity of the Kara Kum region, on the Murgab river, upstream from Merv. High up in the Pamirs, near the frontier with Afghanistan, is the Pamir Biological Station, the Tajik branch of the Academy of Science, where experiments in cultivating hardy crops at high altitudes are carried out.

Turkistan has a long history of mining and craftsmanship: gold and precious stones, metal-work, pottery, and carpets are the traditional wares of the caravan traders. They imply an element in the population with considerable manual skill and commercial awareness. But the last generation has brought about a different assessment of mineral and manufacturing resources.

The survey of minerals shows a wide range which await full exploitation: coal at Mangyshlak, the great peninsula on the north-eastern shores of the Caspian Sea, copper at Almalyk, near Tashkent, and mercury in the Fergana region are conspicuous forms of wealth. Most significant of all for the development of chemical industries and the supply of agricultural fertilizers are the sulphur deposits in the middle of the Kara Kum desert, the huge deposits of sulphate of sodium (Glauber salts) near the Kara Bogaz Bay of the Caspian Sea, and the abundant phosphates of the Kara Tau, the long ridge of hills beyond the Syr Darya: the last are largely on the surface. The possibility of mining and processing these resources suggests a fresh chapter in the economy of Turkistan.

More important in manufacture is the growth of agricultural industries deriving from a better land-use. This is taking the form of factories for processing flour, rice, fruit, and hides, and a great development of textile production, both of silk and cotton, in all the main towns. The towns, like the oases, reflect the arrival of a new economy, with their substantial factories and modern flats and bungalows surrounding the old houses of sun-baked brick used by the traditional craftsmen.

Industry has been stimulated too by the development of hydro-electricity, for the water power of the upper courses of the rivers is a valuable natural asset. In Tajikstan the great dam and power station of Varzobstroy, 10 miles north of the capital, Stalinabad, supplies electricity in southern Turkistan. Farther north is the Farkhadstroy station, where the Syr Darya river leaves the fertile Fergana region and flows towards the steppes. Northwards again, the Chu River has been harnessed to supply the Kirgiz Republic.

Finally, the pattern of the communication system is emerging as a necessary accompaniment to farming, manufacture, and trade. A railway system and skeleton motor roads have appeared where a generation ago movement depended on the one railway track and the caravan routes. The great feats of road-building are those of the Tashkent–Stalinabad highway and the "Road above the Clouds" which crosses the Pamirs. A northern highway of 500 miles is under construction in the Tien Shan ranges to open up the eastern frontier region. Air lines have been important in linking the administrative capitals of the Turkistan Republics, and also in anticipating ground communications over huge distances of steppe and desert, high ranges, and unbridged rivers.

NOTES ON THE MAGADI SECTION OF THE EASTERN RIFT VALLEY

P. C. SPINK AND J. A. STEVENS

The topography between Suswa and Lake Natron

THE LAKE MAGADI district is one of the most striking sections of the Rift Valley, not only on account of the great soda lake which is an unique feature, gleaming white against the surrounding sombre hues of the many fault-block ridges east and west and flat lake beds to north and south, but also because the lake level is below 2000 feet and forms one of the lowest parts of the Rift Valley; it is in fact the termination of a 5000 feet fall from the high point on the Longonot ridge a little over 60 miles to the north-north-east. Much has been written about the soda lake with its hot alkaline springs and inexhaustible white, green, and pink deposits of soda, and it is well known to many visitors, particularly ornithologists. The interesting section of country which lies to the north is less familiar. Before the foundering of the Rift Valley floor, it formed a continuation of Lake Magadi when the latter was joined to the ancient Lake Suess in the Kedong, which in turn was joined through Lake Naivasha and Lake Elmenteita to Lake Nakuru. Indeed, it is probable that at one time an almost continuous freshwater lake extended from Natron to Nakuru, a distance of nearly 200 miles. This may have been in early Pluvial times, before the Rift Valley was formed, when East Africa was colder and far wetter than at present.

A glance at most maps of the section of the Rift Valley between Magadi and the Suswa volcano reveals an almost complete blank of about 30 miles in length except for one or two tentative contour lines. Until recently, few, if any, Europeans had traversed this area from north to south, although several had traversed it from east to west across the Rift Valley. The late Dr. Parkinson records that he travelled some distance up the Valley, where he traced the northward continuation of the lacustrine beds.[1]

A few weeks before I visited Magadi in May 1945, the Locust Control had begun work on the construction of a rough road leading north from Magadi to join the Narok road. This enabled me to make a journey by lorry as far as the southern slopes of Suswa and presented me with an opportunity of seeing something of this little-known section of the Rift Valley. Our camp was situated at about 4200 feet, due south of the denuded volcano of Soit Amut on the slopes of Suswa. I had heard reports of steam vents on the south side of this cone and a search revealed about twenty-five vents of varying size at a height of about 4700 feet. Most of them were situated in two north–south aligned fissures a few yards apart. I estimated one fissure at 25–30 feet deep, and large specimens of a giant nettle were flourishing in the steamy atmosphere. Following this fissure northward, I found that it ended in a dyke of

[1] J. Parkinson, "The East African trough in the neighbourhood of the soda lakes," *Geogr. J.* 44 (1914) 33–49.

reddish phonolitic lava. Several vents issued from other and similar raised dykes. My visit to the summit of Suswa in 1943 had not revealed these vents, but they were probably hidden from view by the bulk of Soit Amut.

The view from this point was impressive and I was able to see the general structure of the Rift Valley as far south as Magadi. It was obvious that this was the lowest part of the valley in transverse section, for on either side to east and west the land rose in successive steps and plateaux. I could clearly see too that, in longitudinal section, the floor of the Rift Valley was composed of several successive lake beds, divided from each other by scarps and progressively falling by steps until the Magadi level of 2000 feet was reached. I noticed that on the west side a section of lake bed formed a terrace approximately 200 feet above the lower lake bed, from which it was bounded by an escarpment aligned north and south. The general appearance of this section of the Rift Valley was of a rift within a rift, or a succession of rift valleys. I concluded that a sudden sinking must have occurred between here and Magadi, leaving sections of the original lake "high and dry" on either side. The lake beds were covered with a good growth of thick green grass, among which the Masai and their cattle roamed. I saw no permanent water. The valley was quite beautiful in parts, with these green expanses bounded by magnificent and precipitous scarps.

Altogether we crossed five lacustrine beds before reaching the final continuous bed which extends to Magadi. The aneroid determined their respective levels at 4000 feet, 3800 feet (15 miles by road from the camp), 3550 feet, 3000 feet, 2700 feet, and the last started at 2400 feet and gradually descended without a break to 2000 feet. These levels are approximate only, but they serve to show the gradual stepping down of the broken lake bed. The beds were divided from each other by transverse, scrub-covered, lava ridges which often rose 200 feet. There was much of both geological and fossiliferous interest to be seen as further evidence that the lake originally extended north throughout the length of the Valley. I found diatomous deposits at the 3850 feet level, and again 18 miles from Magadi, lime deposits also diatomous in places. Near these latter deposits a dry stream bed revealed silico-calcareous rocks full of hollows in which reposed masses of freshwater shell fossils. This was only one of many such deposits, and other eroding stream beds clearly showed the lacustrine silt deposits, often overlain by lava flows and fragmentary lavas. About 8 miles from Magadi a large section was exposed in a cliff face, revealing many strata of alternate sediments and lava tuffs and agglomerates; here I found traces of fish-bones among the sediments. The last section of the Valley to Magadi was notable for its succession of "whale-backed" hills, surmounted in one instance by a pintle-shaped rock and in others by large square masses of lava. These features contribute to the immature character of the topography, which is characteristic of the, geologically speaking, youthful Rift Valley.

On my journey south from Magadi I was fortunate in being able to travel with a locust scout who was going as far as the northern shore of Lake Natron. Passing over the southern arm of Lake Magadi provided me with a close view of the birds for which the lake is famous, in particular marabou stork, flamingo, tern, pelican, and plover. The most striking feature of the landscape

was the consistency of level. There can be no doubt that the two lakes were once joined and, in marked contrast to the Magadi to Suswa route, not a single transverse ridge of any consequence was crossed and the country was almost free from north–south scarps or ridges. Our route lay south-west, past the great massif of Shombole, to the flat swampy area which forms the delta of the Uaso Nyiro river. We pitched camp on a low two-peaked ridge, running north and south between the river and one of the western arms of the lake. A cairn on the ridge marks the boundary between Kenya and Tanganyika. On the north-east side of the summit of the southern peak I found what appeared to be a deposit of large fossilized bones, which may mark the site of a midden. I collected samples which in due course will be examined by experts.

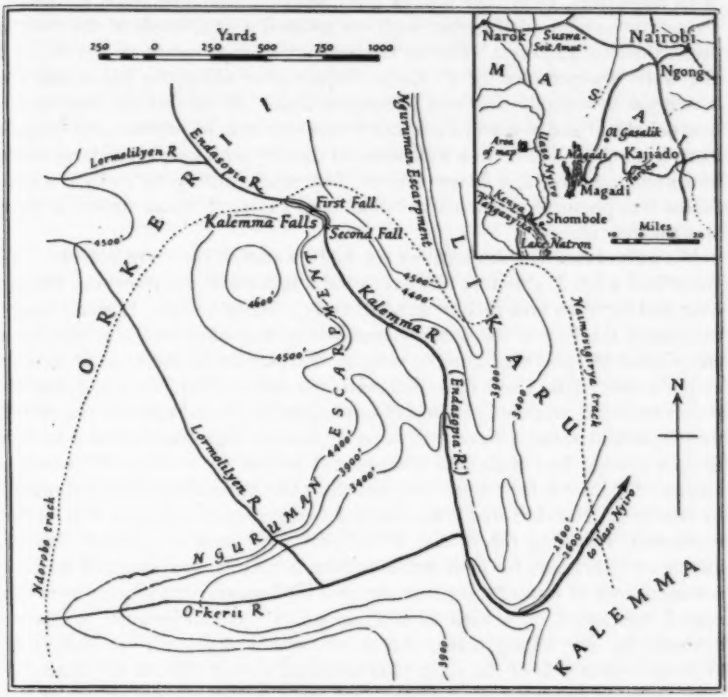
The view to the south looking across the lake was most impressive. Beyond the vast expanse of brown mud flats, partly covered by shallow water in the foreground and areas of white soda deposits in the background, stood a series of peaks: to the south-east the curious-shaped peak of Longido; to the south-south-east the great mass of Gelai; in the centre and due south the beautiful symmetrical summit of Ol Doinyo Lengai (the most active volcano in this area), with its cone streaked white with soda; and to the south-south-west the impressive height of Jaeger Summit. These peaks are the vanguard of one of the finest volcanic regions of East Africa—the Giant Cauldron mountains, which include the enormous Ngorongoro crater. Immediately to the west lay the Nguruman escarpment; to the east was the mass of Shombole.

Not the least interesting part of my visit to Magadi was the rail journey back to Konza, for it gave me a good view of the way in which the country between Lake Magadi and the Turoka river is broken up into many parallel north–south fault-blocks and secondary rift valleys. These faults were most impressive in their clean-cut sharpness. As the train wound its way up between them, I obtained a general view of Lake Magadi in relation to the Nguruman escarpment and the gradually descending fault-lines on either side of the Rift Valley, which enabled me to see how the Magadi sector had sunk in relation to its surroundings to east and west. I was regretful when the train finally wound its way out of sight of this grand and broken landscape, when the great mass of Ol Gasalik was lost to view, and we began to traverse the mild and uninteresting undulations of the Kapiti plains. P. C. S.

The Nguruman escarpment

About 14 miles west of Lake Magadi, the Rift Valley is bounded by the impressive Nguruman escarpment, which extends north and south for some miles and rises to heights of between 6000 and 7000 feet. The escarpment rises in steps by two grassy and well-wooded plateaux, and is divided transversely into sections by deep and precipitous valleys down which run numerous streams. Indeed it is a remarkably well-watered district, in marked contrast to the eastern escarpments of the Rift Valley, which in general are dry areas on the lee side of their hinterlands, whereas the Nguruman escarpment is the windward side of a large block of highland and consequently enjoys a good rainfall. The maps of the escarpment that I have seen are most inadequate: rivers are vaguely shown as descending and joining the Uaso Nyiro River, but they are mostly unnamed and their courses indefinite.

I was fortunate to find that my host, Mr. Stevens of the Magadi Soda Company, was anxious to explore a section of the escarpment which contains the valley of the Endasopia river, with the object of learning something of the hydrology of the river, its rate of flow, etc. Little is known about the Endasopia. It is not known for certain where it rises, although it is believed to have its source in marshy ground on the higher of the two plateaux; nor is it certain whether it joins the Uaso Nyiro, as the Masai says it does, or whether it



Nguruman escarpment and Endasopia river (based on original map by J. A. Stevens)

tapers out in the porous silty country below the escarpment, which is the fate of many initially vigorous rivers in East Africa. We suspected that large waterfalls must exist on account of the steep valley gradient, but the maps showed no evidence to confirm this. As far as we knew no European had reported an outstandingly large waterfall on this river, although Magadi residents had occasionally seen a faint white streak against the dark background of the escarpment, usually during the wet seasons when the river would normally be in spate.

A car journey took us along the Lake Magadi causeway and over several fault ridges, before we crossed the Uaso Nyiro and continued across flat

country to the edge of a large delta area at a height of about 2200 feet, which had evidently been formed by the many streams running off the escarpment during Pluvial times. Walking from there, we crossed many water-worn boulders of all types of rock of which the escarpment is composed, until the ascent began. After a steep climb we came to the first plateau and began the second lap, much of which lay over quartzite rock. At a short distance below the upper plateau we came to the edge of a very deep valley, thickly covered with large trees, where the roar of the Endasopia could be heard far below. Presently we continued higher until we attained a level reach of the river at approximately 4450 feet. The air temperature at 1030 hours was 70° F., and the water temperature 65° F. Large timber grew along the banks and the water was beautifully clear and pleasant to drink. Altogether the atmosphere was delightful and in marked contrast to the heat and dry stuffiness of Magadi 2400 feet below. Here was a well-watered country with long grass, large trees, and numerous rivers, a Masai reserve, but unfortunately tsetse-fly country. Game was plentiful, particularly buffalo and rhino, of whose presence there was much evidence.

We walked downstream until we reached a waterfall known to Stevens. The water had a fall of about 25 feet over a solid lava shelf (the river was flowing over and between lava rock most of the way). While Stevens busied himself measuring the flow of the water, I managed to negotiate the waterfall after a steep scramble, and continued to walk on downstream in the hope of coming across another fall. I was rewarded more generously than I expected, for the rather enclosed, tree-hung surroundings suddenly opened out into one of the most splendid views I have ever seen in Kenya. The river divided in two against a large lava mass and disappeared before me over a cliff which I estimated to have at least a 300–350 feet sheer fall into a large pool surrounded by tall trees. The timbered valley framed a magnificent V-shaped view to the south-east, revealing the distant Rift Valley over 2000 feet below. Immediately on either side towered immense bare lava cliffs, and above all was the continual roar of water falling into the pool far beneath. On looking over the edge I was struck by a blast of cool air which was continuously displaced upwards by the falling water. Later we looked down on the fall from bluffs on either side of the valley and obtained a good view of the beautiful twin cascades, though from neither point could we see the full extent of the fall, since the pool below was screened by tall trees. There can be few, if any, falls in Kenya more impressive than these, which in full flood must present a particularly fine spectacle. They certainly compare favourably with the well-known Thompson Falls on the eastern escarpment of the Rift Valley.

We walked over to the next valley to the south and could hear the roar of the Orkerii river far below. Because of their steep gradient it would seem that all these lateral valleys must contain deep waterfalls, as yet undiscovered by Europeans. For the same reason, it is thought that the Endasopia may contain another fall of considerable size. An aerial photographic survey of the Nguruman escarpment would enable some estimate to be made of the water resources of this well-watered and little-known region. P. C. S.

The history of the Nguruman district

With the assistance of Mr. C. Gillman of Dar-es-Salaam, Tanganyika Territory, I was able recently to study the records of some early exploration in the Nguruman district, and my reconstruction of its history is as follows.

For many years prior to 1883 Ngurumani must have been an important place on an Arab or Swahili trade route from Zanzibar to Lake Victoria, and probably appears on the Mombasa Mission map of 1850 and on Denhardt's map of 1881, though I have not been able to verify this. There can be no doubt that G. A. Fischer had seen maps of his proposed route before he made the first journey by a European through Masai-land in 1883 and officially discovered Ngurumani on the Bagasi river. "Ngurumani" is not a specific name, but is used by the Masai for any place in their country where crops are grown, and there is a second Ngurumani, also called Kalemma, two days' march farther north, which is watered by the Endasopia river. Endasopia is the name given by the Masai to the river above the falls, and from the falls downward it is referred to as Kalemma; for this reason I have applied the name Kalemma to the falls. Fischer crossed the Kalemma river on the second day after leaving the Bagasi Ngurumani, and pushed on northwards along the Uaso Nyiro river. A number of European travellers followed him in later years; and in 1896 von Trotha (*Deutsche Kolonial Blatt*, 7 (1896) 102) also reached Kalemma. From there he climbed the Nguruman escarpment by the Naimosigirya track, used by Lieut.-Commander Spink and me, followed the Endasopia towards its source, and made his way thence to Lake Victoria. As a result of this journey, the Endasopia first appeared on a German map, of which I have a copy, under the name "Dashobia," though in the account of the journey the river is not mentioned. The river is also shown on the June 1944 edition of the East Africa Survey Group map (E.A.F. No. 1539 1/500,000 sheet, Nairobi SAA371), for which I supplied some revised material, including the lower course of the Endasopia. My first visit to the lower river was late in 1937, and my first climb to the upper river was made in November 1941. I was interested in the Kalemma falls for power generation, and I found that the existing British maps of the district were based on the work of the Kenya–Tanganyika Boundary Commission,[1] and did not show either the escarpment or the rivers in this area with any accuracy except sometimes on the Uaso Nyiro level. Accordingly I set about making a rough sketch-map to cover primarily the Endasopia–Magadi district, and this I have revised from time to time as fresh details came to light. J. A. S.

[1] See G. E. Smith, "From the Victoria Nyanza to Kilimanjaro," *Geogr. J.* 29 (1907) 249–72.

LABRADOR AND ITS PEOPLE

OUTLINES OF THE GEOGRAPHY, LIFE AND CUSTOMS OF NEWfoundland-Labrador: the eastern part of the Labrador Peninsula. By V. TANNER. (Acta Geographica 8, No. 1.) *Helsingfors*, 1944. 2 vols. 10×7 *inches;* 906 (436+470) *pages; maps and illustrations*

THE COMPLETE geographer is a man of wide learning and field experience. He must know far more than the rudiments of the natural and social sciences, an achievement not too uncommon a century ago, but exceedingly rare in these days of specialization. He must also be a traveller who preserves an unbiased approach to his selection of the multitude of facts thrust upon him by a receptive eye; and finally he must analyse and interpret with a discipline of mind befitting the subject of geography as a science. There can be few who combine such capacities as Professor Tanner, whose book may be taken as a model by any student aspiring to merit the title Geographer.

The results of two expeditions to Labrador in 1937 and 1939 are given in two volumes, the first concerning natural history, and the second anthropology. The work is profusely illustrated with photographs and diagrams, and is completed by an exhaustive bibliography. Professor Tanner wrote his book in English, a formidable task, and was assisted by Miss Agnes Dawson in correcting manuscript and proofs. The omission of a satisfactory map is the one real fault, and a big one, in the otherwise splendid lay-out of this book which, one is pleased to hear, may soon be issued in this country by the Cambridge University Press.

Volume I begins with an exhaustive summary of the history of discovery and cartography, and proceeds to an excellent description of the geology. The basal Archaean, part of the Canadian Shield, is a folded crystalline complex striking north-north-west, parallel to the coast from the Straits of Belle Isle to the Button Islands. The rocks of the northern part of the coastal zone are mostly igneous in origin, but to the south a sedimentary series of Timiskaming age is exposed. The folding zone has been named the Labradorean Mountain Chain by Kranck, a geologist who took part in the expedition. This is an unfortunate name, liable to cause confusion, since Cooke has already called the late Algonkian folding the Labrador Range. The complex was worn down to its roots by prolonged disintegration, to form a featureless peneplane near sea-level, and on this were laid, with sharp unconformity, Algonkian sediments, slates, quartzites, dolomites, and some extrusives. Odell regards the sediments as corresponding with the Upper Huronian of the Canadian Shield. Folding was succeeded by peneplanation and an epoch of intensive desert weathering. This gave rise to the formation of arkose sandstones and conglomerates, provisionally dated as late Keweenawan, which are preserved in isolated fault-graben of Tertiary or post-Tertiary age. Other pre-Cambrian rocks are potassium-rich granites and syenites, unaffected by tectonic movements, and later swarms of trap dykes. The Palaeozoic rocks are fossiliferous Cambrian confined to the extreme south, and some Ordovician believed to exist in the north. This period ended with uplift and mountain-building, which continued into Devonian times. Subsequent erosion, without diastrophic interruption, continued nearly to the Pliocene, but no deposits of intervening age have been found on the highland surface.

The peneplain so produced extends over the whole of Labrador, and far to the east of the present coast on to the continental shelf. Post-Tertiary movements and erosion have considerably altered it, but even in the most dissected

regions of the Torngak Mountains, remnants can be seen as small facets on the highest summits. The plateau surface rises towards the north and is generally undulating and rocky; sometimes it is flat where drift has filled the valleys and formed great expanses of moraine-dammed lakes, elsewhere interrupted by scattered monadnocks of resistant rock. Rejuvenation of old rifts in the basal complex led to uplift of this plateau in a mosaic of large blocks, up-faulted along the present Atlantic seaboard, down-thrown farther east to form the continental shelf. Little is known of the morphology of the latter, but there is evidence of sub-aerial drainage patterns, difficult to account for except by assuming submergence of a date later than the erosion consequent on change of base level during uplift.

The evidence for this uplift and its age is entirely morphological. There are several types of river-valley, the most striking being deep, well-defined canyons, such as the Assiwaban and Fraser, which follow rift features and have been cut 1000 feet or more below the plateau surface. Headward erosion appears to follow straight fracture zones, but has not cut far back into the tableland, from which the rivers descend abruptly into the canyons. Other rivers, such as the Hamilton River which forms the Grand Falls on reaching the Bowdoin Canyon, pass alternately through canyons with many rapids and large graded valleys partly drowned in lakes. The third group, on the less dissected portion of the plateau, have entrenched, superimposed, serpentine forms. Odell points out that in the Torngak the drainage system is inconsequent, the rivers rising in low ground to the west and passing through the high mountain belt to the Atlantic. The drainage here appears to be under structural control; a rectangular valley pattern runs parallel to the main trend of foliation and cleavage in the one direction, and to the system of cross joints and faults in the other. These river forms are due to the incision of an antecedent drainage on a rapidly rising land-mass. The more youthful forms, with rapids and falls, are found in the smaller streams; the less youthful forms are graded in the larger valleys. In places where the plateau has not been much uplifted, the valley form is more mature owing to lateral erosion. The fact that the valleys are filled with glacial debris puts an upper limit to their age, but their youthful character suggests that they cannot be much older than the Pleistocene. Cooke concluded that they were initiated in the Pliocene, and were graded before glaciation set in; and that their submergence, either by continuation of block-faulting or by rise of sea-level, produced a ria-coast which, on glaciation, was transformed into a true fjord-coast of fjords, archipelagos, and *skjaer-gård*. This sequence of events appears to be similar to that in Fenno-scandia, but the author does not press the point further than to remark on the homologous morphology. It is to be hoped that, with his vast knowledge to draw upon, he may find it possible to go into the matter more thoroughly, and also to examine the similarities with Baffin Land and west Greenland.[1]

Another of Professor Tanner's multifarious studies was the physiographic effects of glaciation. One of his main objects was to determine a graphical synthesis of levels of raised beaches, with which to demonstrate the isochrony of groups of shore lines and their relationship to isostatic recovery in the post-glacial period. Professor Tanner must have surmounted enormous difficulties in obtaining instrumentally-levelled heights of beach lines in virgin forest of heavy black spruce, in selecting areas unaffected by solifluxion, and in differentiating between true marine and lacustrine or fluviatile levels. It is a tribute to a strictly scientific mind, which would not be satisfied with the easier but less accurate readings of a barometer, that the results justified his theoretical sur-

[1] See J. M. Wordie on the 1934 and 1937 arctic expeditions, *Geogr. J.* 86 (1935) 297–316, and 92 (1938) 385–421.

mise of agreement with Fennoscandia. Details are to be published later, but it appears that Labrador, as might be expected, lies within the "hinge-line"—that is, close to the Pleistocene upheaval area—and the beaches are therefore tilted. The highest terraces become progressively older from the centre of the uplifted area outwards; those nearer the centre pass towards the periphery below the older terraces, owing to the fact that as the ice-sheet was melting and contracting towards the centre, the land was rising in the periphery. As in Fennoscandia, the centres of radiation of the inland ice were not fixed, but shifted with changes in meteorological conditions. "In consequence of this, the radiation axis, the so-called 'ice-divide,' cannot be assumed to form any real line of separation . . . but must be thought of as forming something of a mathematical focus." The main centres of radiation lay to the west of Labrador, but at the height of glaciation, subsidiary radiation centres developed in the centre of the peninsula and moved north and north-west.

The first volume continues with a summary of what is already known about the oceanography, which naturally centres on the Labrador current. The next section, meteorology, is excellently concise, and is followed by a section on botany Despite the meagre information available, Professor Tanner has been able to produce a map showing the distribution of tundra, brushwood, and forest. Pure forest types do not exist, and most of Newfoundland-Labrador, except for the "barren grounds" and mountains of the north, is occupied principally by taiga, a variety of woods, fens, and bogs alternating rapidly with change of terrain. The tundra is a land of barren hills, covered with heath or sterile *felsenmeer*. The coastal tundra, resulting from exposure to Atlantic winds, is open country with no forest, the highest growth being stunted conifer and low willow. This merges westwards into the forest belt, which is generally a mixture of spruce, balsam fir, white birch, and tamarack larch, with black spruce forming about 90 per cent. of the timber. The forest is of poor quality, and not so extensive as the map suggests, for it is much broken up by lakes, bogs, and stony areas, and devastated by fire. The author believes that only 20 per cent. of the forest area is commercially useful, which is much less than was estimated by the Newfoundland Royal Commission of 1933.

Volume II is further proof of Professor Tanner's versatility. It is an anthropological study of the Labrador population—Eskimo, Indians, and whites—and their cultural changes or reactions to environment and impact on one another. The technique of approach to, and presentation of, the problem is perhaps not quite that of the social anthropologist, but the observations are there and are made by a student of human geography.

The Eskimo, of whom there are about one thousand nine hundred, are now semi-nomadic. They have a traditional, fixed, winter house, and on this centres their seasonal cycle of nomadism. The Nainimiut are fairly typical. In the early part of winter they remain in their wooden huts around the mission station, repairing and making new gear for the hunting and fishing. The station is their home. Fox-trapping begins about the middle of October, when traps are set in the nearby islands of the archipelago for foxes coming south for the last of the autumn seal-hunting. After Christmas, when sledging conditions are improved, the hunters move into the heads of the fjords and a little inland after fox and caribou, building snow houses as they are needed. Fox-trapping finishes about the middle of April, and the hunters return to the station to begin the early spring seal-hunting at breathing holes in the ice—the "maupok" technique of Baffin Land and north Greenland. Here, in northern Labrador, the rifle is not so much used as in the south, probably because these Eskimo are better hunters. Seal nets are repaired during early summer in preparation for the autumn, and

journeys are made to the inner bays and fjords to catch rock-cod for dog food, and to collect firewood.

In summer the families move out to the shores of the bays, principally to fish for sea-trout (for which good money is obtained at the store), and for cod. The sea-trout used to be speared behind river dams, but this is now forbidden and instead they are netted. Eggs are collected and kept as tit-bits for winter consumption; puffins and guillemots are preserved with fat in seal-oil bags for the same purpose. Some families now carry out these activities from small summer huts, perhaps less hygienic than the easily-moved, calico tents. In August and September the cod shoals are followed by boat. As the ice forms and the seals are forced into smaller channels, seal-nets are laid in the outer islands and the hunters wait in small sealing cabins. Seal-nets were introduced by the Moravians in the eighteenth century, though the principle must already have been known to the Eskimo precursors of the Labrador people, as baleen seal-nets are found in quite early remains in north Greenland. The use of seal-nets is a cooperative activity, and the returns are greater than they would be by individual hunting; a communal economy is innate in the Eskimo. The seal-hunt finishes with ice-hunting by kayak and by stalking at the seaward limits of the newly-formed ice. The families return to their winter homes in September, and the hunters in November, before the freeze is complete. Firewood is collected in September and October by sledging over the new snow.

There are local variations on this cycle. The most southerly Eskimo—the Lake Melville and Rigolet Eskimo—trap foxes in the winter, fish salmon from spring to late July on Henrietta Island, and in the autumn move out to Hamilton Inlet for the cod-fishing. They also hunt some seal in the late winter and early spring. At Hebron, north of Nain, nomadism is not so marked. Here on the edge of the ocean the hunters do not have far to go to obtain seal, which provides them with all they require, and they can also fish and trap foxes from their settled homes. It is the same at Hopedale, south of Nain.

This complex of cultures has been derived, through contact with European culture, from an original in which a seal economy predominated. The groups, generally familial, were then completely nomadic. European elements were introduced, principally by the Moravian missionaries, who, in trying to keep out unscrupulous traders, encouraged the Eskimo to diversify their products by lending them seal-traps and nets, paying for furs, providing ammunition, and endeavouring to preserve their original nomadic independence. Tanner believes that the culture pattern is now stable in its semi-nomadic condition, the territorial grouping being based on the fixed winter house, planned with "thorough knowledge and far-sighted judgement by the Missionaries," though he adds on the next page that it is "probable that the Eskimo themselves discovered the advantages of living near the missions" and that stabilization was spontaneous. It is doubtful whether the author's conclusion is the only possible one. He does not consider whether this apparent stability is in fact only a phase of acculturation, for his evidence could be interpreted as showing progressive acculturation northwards, as in west Greenland. Harmonic cultural patterns may have the appearance of stability, but among semi-nomadic peoples it is not truly so. "The Labrador Eskimos are distinguished by an extremely over-excitable mental life which reacts easily to small impulses in an abnormal way." This is essentially a behaviourism associated with harmonic patterns of equilibrium and fine adjustment to conditions, not the harmony of sedentary patterns of stability broadly adjusted to changing conditions. The Eskimo have entered on a "stage of fermentation" as Tanner himself remarks, of adjustment to contact with the whites and new forms of economy. On this point Professor Tanner says, "if the local

trade is not regulated in such a way that it *de facto* safeguards the Eskimo's economic autonomy, he will, like the Labrador Indian, gradually sink deeper and deeper into economic dependence and perpetual indebtedness with all their evil consequences. A reform is necessary and should start from payments in cash for the Eskimo's products, instead of as now, in trade." This is a matter for intervention by the authorities between buyer and seller.

The Labrador Indians of the interior are divisible into two groups: the Montagnais, of whom there are perhaps seven hundred, who hunt the taiga country and do not venture into the tundra; and the Naskaupi, now numbering about two hundred, who formerly occupied the interior "barren ground" tundra of the north, but have lately been forced to hunt in the taiga, though they rarely come farther south than the latitude of Davis Inlet. The two groups speak dialects of the one language, Cree, but some Montagnais find difficulty in understanding the Naskaupi. It seems that the Beothuks were the original inhabitants of Labrador, but were pushed south to Newfoundland by the Thule Eskimo driving down from the north, and by the Naskaupi-Montagnais Indians from the west, under pressure from the Iroquois who moved north-east in the seventeenth century. Later, the Miconae of the Gaspé Peninsula crossed the St. Lawrence, driving the Montagnais north, with the result that the Naskaupi were forced into the tundra country which they occupied, at least in Labrador, until 1912. Speck gained the impression that group consciousness separated them, as well as dialect difference. Certainly they are each aware of some difference, but the form of awareness is not analysed. There is little cultural distinction, but there is a definite anthropo-geographical difference.

To the Naskaupi of the tundra caribou is vital. Hunting is extensive, and is carried out over large areas by the community as a whole. The economy is communalistic, but the social structure is loose and incoherent. In the taiga the caribou is not so important, for there are also beaver, porcupine, hare, birds, and fur-bearing animals. Hunting is intensive over small areas covered by family groups. The economy is individualistic and the family hunting group is fairly coherent. This is a natural trend in cultural development: the farther north and the more rigorous the climate, the fewer the families and the more uncertain the game—hence the social and hunting systems are less organized.

The author contributes much new information on the Montagnais. As a hunting people they are completely nomadic, following a seasonal cycle of activity. In the late summer they move to the inland hunting grounds, each family group having planned the number of individuals its territory can sustain, though nowadays they do not feel confined to their original hunting tracts as they once did. Until the cold sets in they fish, mostly for trout, and later catch hares and porcupines. In early October the caribou rutting season commences, and the caribou drives become the chief interest. The animals are driven between converging fences or lines of brushwood, and are either caught in *babiche* (skin) traps, or speared or shot. By early November the lakes are frozen, the canoes are laid up, and work begins on assembling the winter gear, dressing skins, and setting traps. Winter is the season of long journeys by foot, when each member pulls his own *tabanask*, or toboggan of birch or larch boards. A few weeks only are spent in each camp, and lines of traps are set out, some as many as 30 miles long. The chief food is hare, porcupine, birds, and fish caught through the ice. In February the caribou hunting is at its best, and the whole band of several families may share the results of one big drive, though other animals caught by trap belong to the individual trapper. While the men hunt, the women fish, still using ancient forms of wooden hooks. Hunting is carried on through the spring until May, when they return to their canoe store and prepare for their journey,

after the June break-up of ice, to the coast, where they spend the summer fishing, collecting eggs, and catching or shooting water fowl. Professor Tanner does not believe that the coastal migration was original, for they used to meet inland in summer and make the time a period of festivity and meeting. Much time is wasted in this migration from productive grounds, which is not natural to a hunting community. The cause of the change is not made clear.

The Montagnais are a conservative people. When ammunition runs short they resort to the bow and arrow, stone scrapers and stone pipe-bowls are still in use, and it is only lately that stone arrow-heads have been replaced by metal. The office of chieftain survives, and is paternally inherited within the family group. Their religion is ostensibly Roman Catholic, practised in a mass and almsgiving during the day or two they are in contact with the missionaries on the coast. Their "adoption" of Christianity is probably a double insurance towards success in hunting, for they still respond to inherited traditions of animism and demonology, old incantations and prophecies being in use, and conjuror-shamans influential. They are child-like in their impulsiveness and restriction of ideas, and an abstraction is difficult for them to comprehend. The idea of the "great spirit" probably fits in with their animistic conception of the spirit overlord, the caribou god. The decay of the concept of the family hunting ground appears to be due to two factors: large forest fires have destroyed, in fifty years, nearly half of their hunting grounds; and white trappers, who recognize no prior rights of Indians, are rapidly encroaching on their territory. The disintegration of this great family social system means that the individuals become progressively disorganized socially, and so become easy to expel. They are coming more and more under the influence of the Company who direct them in their exploitation of the hunting grounds. "With some exaggeration it may be said that in this way the Indian hunter is becoming a kind of intelligent hunting-dog for the trader, kept alive by him to bring him skins." The author goes on to state however that as far as he could discover, "the company has on the whole acted in a manner absolutely humane," and though they naturally had little interest in developing the naïve, primitive mentality and talents of these people, nevertheless they had done them an unconscious service in preventing them from being concentrated in agricultural settlements as the Jesuits desired.

The Naskaupi call themselves Nenenot. They are essentially a people of the stone age, largely preserved from European contacts, and only recently Christianized. The author divides their cultural history into two: a Barren Grounds Period prior to 1912, and a Voicey's Bay Period subsequent. Their tools and artifacts during the Barren Grounds Period were primitive and made of bone, antler, and wood, not unlike the most primitive Lappish artifacts. The group seems to have been composed of kinsfolk, a kind of clan, still in evidence among them to-day. The caribou was the centre of their economy, providing food, tents, clothes, sinews, and smoked skin for thongs. They were not interested in trapping, but white foxes accompanying the caribou herds were also hunted. In late summer they collected at Indian House Lake to cover the caribou migration there, often with improvident killing of whole herds. This led to starvation, for the caribou frequently changed their migration routes, and a Naskaupi Indian without caribou considered himself starved, even when he could find other game. In autumn the group scattered in families to hunt individual caribou and small game, but, as winter came on and the barren ground became desolate, they were forced to migrate into the taiga and there to adopt a way of living similar to that of the Montagnais. In such border conditions they still retained their communalistic ideas.

The Naskaupi seldom came near trading posts except when the caribou failed them. In the first decade of this century the caribou migrated from Newfoundland-Labrador, and the Voicey's Bay Period commenced with the first visit of the Naskaupi to a trading post, which has now become an annual visit. They are to be found at the post by May, and remain there till June, while some make a few excursions inland to trap fox. Later they move to Indian House Lake where they stay to hunt the caribou during migration. They make two short visits to the post in August and November, and return to the interior where they remain until the spring, hunting in the taiga like the Montagnais. They congregate when necessary, to hunt caribou, but the idea of separate hunting grounds does not exist. Their chief prey is the fox which is trapped for its fur, and there is a plentiful supply of other game and fish.

The Naskaupi have been little affected by the Roman Catholic missionaries, and are said to retain many of the social-religious beliefs of the earlier culture pattern, which resemble Eskimo animism and demonology. Everything in life is controlled by supernatural powers, the ritual prior to hunting must be rigorously observed, and indeed the hunt itself becomes a ritual. They have now few stone artifacts, but retain all the fundamental Indian forms—the canoe, snowshoes, toboggan, bow and arrow, steam bath, and so forth. Clothing has become European, but they have not yet learned to read or write. They make the most of their outside contacts with Eskimo, from whom they have borrowed such things as the woman's knife or *ulo*. According to Professor Tanner, their cultural convergence with the Montagnais, due to the incentive of environment, is a circumstance upon which the administration could well build.

The white people, of whom about four thousand are permanent inhabitants, fall into several categories. Apart from traders and missionaries, there are trappers, "liveyeres" who are settled fishermen, and a transient fishing population called "planters," or shore fishers, and "floaters," or schooner fishers. Scarcely any of the permanent population are purely trappers or purely liveyeres; they both hunt and fish at different seasons.

The trappers, by tacit agreement, recognize an individual's rights to a line of traps, or trapping-path, which he has inaugurated. Thereafter the ground belongs to him and his descendants. The elder sons usually establish their own trapping-paths; the youngest son falls heir to his father's land and gear, and looks after his parents, even after he marries. A path may be rented out to trappers outside the family circle, the owner supplying canoe, tent, and stove, and receiving a third of the catch. The fur-bearing animals are marten, mink, otter, beaver, weasel, ermine, musk-rat, lynx, bear, and fox. The trappers have fixed dwellings in small villages, usually centred around a Grenfell Association hospital and school, or a trading post. Since the furs are at their best in early winter, the trapper leaves his home at the end of September, and makes his solitary way to his trapping ground in his canoe. Two may share the canoe journey, but for many winter months each man is alone in the taiga. Some remain on their paths all winter, staying there until the middle of April, the end of the spring hunt. Life is easier in the later months, for the snow is hard and the going easy. During this time, some sledge in supplies for the next winter, and carry out their canoes on their return, since they cannot be floated out until late in June. Back at home, where his wife has been busy all winter keeping the family fed, the trapper immediately starts seal-hunting by net, ice-fishing, and shooting geese and duck from his canoe. There is also the store of wood to be felled, and sledged in or floated home. In summer the garden is planted with potatoes, cabbage, and lettuce, and there are many household jobs to be attended to. The income ranges from one thousand to three thousand dollars a year.

On the outer coast live the resident white fishermen, or liveyeres as they are called.[1] Whereas the trappers of the inland waters are almost all of pure Scottish, English, or Newfoundland descent, a number of the liveyeres are half-breeds. North of Hopedale there are said to be almost no pure white residents except missionaries and traders. The liveyeres keep to the coast in summer, inhabiting small clusters of wooden houses which in the south are neat, clean, and roomy but become progressively smaller, dirtier, and more untidy towards the north, where they are merely a few stakes thrust into the ground and covered by moss and bark. In winter the liveyeres move into the bays and sheltered areas. Fishing is their livelihood. From the middle of June to the end of July salmon is netted, the nets usually being lent by the Company. Northwards, salmon is not so important, and from Hopedale to Hebron sea-trout is more important. The cod-fishing soon follows. The cod are caught by jigging in most places, though in the south nets are occasionally used; in the autumn baited lines are used. The fish is immediately cleaned and salted, and later, in August, it is washed and dried. A by-product is cod-liver oil. Herring is caught in August and September for dog food, and the autumn ends with wood-gathering. In winter, from November to April, traps are set for fox and weasel in the sheltered bays and coastal valleys. Seal are shot on the ice in March, and from April to May are caught in nets. The culture pattern is thus another variant of a complex of adopted aboriginal forms.

Grenfell's assistant, Dr. Paddon, concluded that the poverty in which most of these people live is attributable to three causes. First, mixed blood produces a type requiring sympathy, stimulation, and firmness. Second, they are ill-equipped for trapping in both training and gear. Third, attracted by community life, they naturally congregate in settlements, and soon fuel and local food supplies are insufficient. The author was told that the immigrants from Newfoundland have not been able to adjust themselves to the life, whereas Scottish and English settlers, socially selected, hardy, and enterprising, manage to retain their standards. Professor Tanner comes to the conclusion that ancestry is the decisive factor, but owing to the lack of records he has no statistical proof. This can hardly be the whole truth. These liveyeres, and the trapping communities too, have been in existence for several generations. Processes of social selection and adaptation must have been in action during that time, as well as infiltration of new blood. It seems to the reviewer that a socio-psychological approach to the problem would be of value in guiding the administration in its efforts to alleviate conditions.

The author finishes with a survey of industry and trade, and possible mineral resources, leading up to a concluding section on the future of Newfoundland-Labrador. Either the country must remain an exploitation colony, run by capitalistic enterprises while the Government maintains only law and order, or the State must enter into the exploitation of the permanent natural resources. He feels that it was to the good of Labrador that no big industry had started before planned colonization began, and suggests that the State might find the example of Finnish enterprise in a similar land worth while following. Having built up a population able to withstand the severity of the climate, capable of utilizing the soil, and skilled in hunting, trapping, and fishing, the Government should establish a national forestry industry, and later found upon it other industries. The author believes that mixed farming with cattle rearing is possible, as in northern Fennoscandia where the climate is also rather continental. The liveyeres and trappers would find part-time occupation, when trapping and fishing are not in season, in the multifarious outlets of forestry,

[1] This is thought to be a west of England corruption of the words "live here."

first in constructing roads, booms, log-houses, and so forth, and later in actual timber production. The enterprise would require State subsidy at first, but later a profit-yielding timber industry would arise with free competition between individual firms. Professor Tanner has faith in Labrador.

T. T. PATERSON.

REVIEWS

EUROPE

ENGLISH RIVERS AND CANALS. By FRANK EYRE and CHARLES HADFIELD. (Britain in Pictures, No. 84.) *London: Collins*, 1945. 9×6½ *inches; 48 pages; illustrations and maps. 4s 6d*

The first thirteen pages of this book are devoted to rivers; then follow ten page on canals; and a final twenty-two pages on rivers. The sections on rivers make enjoyable and instructive reading, written as they are by an enthusiast who knows his rivers from frequent journeys upon them by canoe. Mr. Eyre's account of the pleasures to be obtained by such canoe journeys is more than a hint to tourists and holiday-makers. It is unfortunate that in his short treatment of the work of rivers he should appear to be out of his depth, and the sections on pp. 12–13 and pp. 28–29 contain several misused terms and questionable statements. From his remark on p. 31 however, dealing with the Thames, ". . . the sometimes extraordinary effect of consummate artistry which the final result of her meanderings has achieved. The river curves exactly as it should to extract the last ounce of beauty from the landscape," it would appear that Mr. Eyres would make an apt student of geomorphological studies of river action. The section on canals, by Mr. Hadfield, forms an excellent introduction to the subject, though it is all too short, and deserves a separate volume. There is some useful information about the most recent developments in English canal and river works (though perhaps a little more might have been said about the present position of the Severn navigation).

The illustrations in this volume maintain the remarkably high standard of the series. Geomorphologists will obtain a particular as well as a general pleasure from J. S. Cotman's splendid View at Rockliffe on the Tees.

The map showing the chief rivers and canals might well have been made larger. It contains one or two common errors, *e.g.* the unusable Wilts and Berks Canal would be better not shown on the same map with the Grand Union. It is a pity also that the rivers at present navigable by barges could not have been separately distinguished. As a whole however this little book is both agreeable and informative.

F. W. M.

QUELQUES NOTES SUR LES COMMUNICATIONS DANS LES BALKANS. By L. BOCHKOFF. *Sofia: Académie Bulgare des Sciences et Arts*, 1945. 9½×6½ *inches; 46 pages; maps*

This monograph by a Bulgarian civil engineer, who has been a director of the State Railways and Ports, has two main objects. The first is to outline the present communications pattern of the Balkan peninsula and to suggest means for its improvement; the second is to show how Bulgaria, with the best railway network of the four countries concerned, is hampered in its external connections by the absence of bridges over the Danube and the lack of an adequate outlet

to the Aegean coast. The author starts by saying that he will avoid politics and consider only "common Balkan interests." But it is clearly impossible for a Bulgarian to take a completely dispassionate view of the subject, and, although one may sympathize with much of what the author has to say, one feels that the monograph would have carried more weight if it had been written by a neutral.

The basic ideals for the improvement of Balkan routeways are four in number: freedom of movement, which must depend on the political situation; the improvement of through routes, especially between the capital cities; the securing of shorter routes to north and north-west Europe by building bridges over the Danube; and the freeing of port hinterlands from frontier blockages.

There are striking contrasts in the railway status of the four Balkan countries. Albania has no railways at all, and in view of its economic situation and the physical nature of its eastern half none is foreseeable. Yugoslavia has a fairly full network, due to an enlightened State programme between the wars; its main needs are for easier access to the Adriatic, and the completion of a potential Zagreb–Kraljevo line which would double the Sava valley route. Greece is nowhere favourable to railway development, and its total mileage has increased by less than 10 per cent. since 1914. By contrast, Bulgaria has an extensive though not yet complete network of State railways, which has increased by nearly 50 per cent. since 1914.

The Bulgarian railway system is more literally a network than that of the other Balkan countries. But its north–south lines, unlike the east–west ones, have no international significance, since their northern termini lie on the unbridged Danube, and Greek Thrace interposes a barrier between Bulgaria and the Aegean. There is no bridge over the great international waterway in the 520 miles between Belgrade and Cernavoda, and at least three are needed: one at Brza Palanka between Yugoslavia and Romania, and two between Bulgaria and Romania at Gigen and Ruse respectively. The most obvious needs in the south are for unrestricted movement down the Struma valley to Salonica, and for the completion of the north–south trunk line to the Aegean coast at Porto-Lago, which the Bulgarians, during their 1913–20 occupation of the area, hoped to make their principal port.

The author dwells at some length on the "tragedy of the Rhodopes," a tragedy familiar also in other parts of the Balkans, but here accentuated by the enforced transfer of population from the area taken over by the Greeks after the 1914–18 war. The under-development of the Thracian plain and the decline of the ports which have been separated from their natural hinterland, are part of the same problem. In this connection it should be noted that Article 48 of the Treaty of Neuilly, which was to have guaranteed the Bulgarian outlet to the Aegean, was never implemented.

The text is largely an explanation of about twenty maps and diagrams, some of which are not particularly apposite (*e.g.* maps of Roman roads and Hellenic colonies). Two maps, with their text, attempt to show that Sofia is the natural communications centre of the Balkans. Another, by drawing equidistant lines inwards from the boundaries of the Peninsula, arrives at two fundamental route foci, one to the east of Skoplje, the other near Stara Zagora. These foci, with trunk lines radiating from them to Yugoslavia, Greece, Istanbul, and the Danube delta, form the basis of an ideal railway pattern.

The maps are well printed, but the volume is somewhat flimsy, and there are numerous misprints in the French text. S. H. B.

ASIA

SYRIA AND LEBANON: a political essay. By A. K. HOURANI. *London: Oxford University Press*, 1946. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* x+402 *pages; folding map.* 18*s*

This book is issued under the auspices of the Royal Institute of International Affairs. It is described as a political essay and readers will be well advised to note the arrangement which is rather curious. Part I is a condensed history of Syria down to the peace settlement after the four years' war. The history is not resumed until Part III, which gives an account in much greater detail of the mandatory period down to 1943. Part II, which is sandwiched between the narrative sections, is concerned with various aspects of the ideological conflict arising from the impact of western civilization on Arab society: this is the kernel of the essay. Mr. Hourani is peculiarly well qualified to appreciate the conflict. "English by birth and education," runs the advertisement on the cover, "he is still attached, through his family, to Syria and Lebanon, where recently he has spent long periods." He is an Oxford graduate, a Christian and an intensely patriotic Arab.

The historical sections, Parts I and III, have all the merits of other publications of the Royal Institute of International Affairs. They provide a succinct and balanced account of the main events down to 1943, and the texts of relevant documents are printed in a long appendix. These chapters will be of permanent value to students who want a brief account of the period in question. The only criticism to be made is one which is forestalled by the author in his preface: as a discussion of current political issues this section is already out of date: events have moved rapidly since 1943 and a new set of problems, of which there is the barest hint in the postscript, are now demanding attention.

It is quite otherwise with the more difficult matters treated in Part II. Three of the Arab states which form part of Greater Syria—Syria, Lebanon, and Transjordan—have now won their independence: how they should use it is the question which Mr. Hourani discusses in chapters on the problem of westernization, the westernization of ideas, Arab nationalism, and so forth. How, he asks, are these people to enter into communion with the West and yet save their own souls, how escape becoming Levantines? "To be a Levantine," he writes, in a striking paragraph, "is to live in two worlds or more at once, without belonging to either; to be able to go through the external forms which indicate the possession of a certain nationality, religion or culture, without actually possessing it. It is no longer to have a standard of values of one's own, not to be able to create but only able to imitate; and so not even to imitate correctly, since that also needs a certain originality. It is to belong to no community and to possess nothing of one's own. It reveals itself in lostness, pretentiousness, cynicism and despair."

We must leave readers to find out for themselves what demands Mr. Hourani makes both of East and West. They will be well rewarded. J. W. C.

HIMALAYAN HOLIDAY: a trans-Himalayan diary, 1939. By PETER YOUNG. *London: Herbert Jenkins*, 1945. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 108 *pages; maps and illustrations.* 10*s* 6*d*

During the summer of 1939, the author, while serving with the R.A.F. in India, spent his leave on a shooting expedition in northern Kashmir. Setting out from Srinagar early in May, accompanied by a local Shikari and three other servants, Young followed up the Sind valley to its limit and thence trekked over the Zoji La, which at that time of year is under deep snow and inaccessible by road. Near

Dras the party had its first success in shooting a red bear, but, due to the restrictions imposed by the local game laws and confusion over the issue of a licensed block, the rest of the hunting was disappointing.

On reaching Leh the author therefore decided to change his plans and indulge in a burst of exploration up the little-visited Nubra valley, where a dotted line on the map showed him the route taken by Dr. Longstaff and others to the snout of the great Siachen glacier. A few miles from the snout of the Siachen the map indicated a tributary on the west, marked with a pass sign at the head and the name Gyong La. The pass, if feasible, would provide a direct link between the Nubra and Saltoro valleys. There appears to be no record of any traveller having crossed the Gyong La, and in the hope of breaking new ground Young decided to make the attempt. Although he was unable to discover the pass, he achieved some useful exploration in the few days at his disposal and succeeded in reaching a point just below the head of the northern fork of the glacier holding the key to the pass. Unfortunately time did not permit him to examine the southern fork. Returning to the confluence of the Nubra and Shyok rivers, Young's party continued east down the Shyok valley as far as Skardu, and thence across the Deosai plains to join the Srinagar–Gilgit road at Burzil.

The book is an edited version of the author's diary, breezily written and containing much that is of interest concerning the country and people along the route. The photographs are interesting, but suffer to some extent from poor reproduction.

As an amateur explorer Squadron Leader Young may be said to have achieved a great deal. The account of his journey provides a useful guide to others similarly inclined, as well as demonstrating how much can be achieved in a short holiday by anyone who has sufficient enterprise, without any of the equipment and technique of the experienced mountaineer. P. G. M.

CHINA—TIBET—ASSAM: a journey, 1911. By F. M. BAILEY. *London: Jonathan Cape*, 1945. 8×5½ *inches; 176 pages; maps and illustrations.* 10*s* 6*d*

The first chapter of Colonel Bailey's book deals with The Problem of the Tsangpo. A hundred years ago it was an open question whether the Tsangpo of central Tibet flowed into the Yangtze, the Mekong, the Salween, the Irrawaddy, the Lohit, the Dibong, or the Dihang. Colonel Bailey relates how, by 1911, the work of agents of the Survey of India had led to the conclusion that the Tsangpo must be identical with the Dihang, which reaches the plains of Assam near Sadiya. But the course of the river between its then lowest known position in Tibet at a height of some 9500 feet, and the point where it flows out into the Assam plains at a height of about 500 feet, had not been traced. It was a matter of speculation whether the fall of 9000 feet in some 120 miles was accomplished by great falls or by a series of rapids.

In January 1911 Bailey, alone and without any official backing, set out from England on the trans-Siberian route to China. From Pekin he went by rail to Hankow, and thence journeyed inland by water, by chair, and by pony, reaching the Tibetan frontier near Yenching on the Mekong on June 10. This was the farthest point to which his Chinese passport took him and he had no permit to enter Tibet. Nevertheless he continued some 60 miles south-south-west to Menkong, and a further 120 miles first west and then north-west to Shugden Gompa. Here, on the threshold of the area through which the Tsangpo flows, he was turned back by the local Tibetan authorities. Retracing his steps 60 miles to Drowa Gompa, he came down the Zayul Chu to Rima on the Tibet-India frontier, and on through Mishmi country to Sadiya, which he reached early in August.

Although the principal object of the journey had not been achieved, much unknown country had been traversed and geographical and other data collected. Colonel Bailey's achievement was recognized by the award of the Gill Memorial by the Royal Geographical Society and the Macgregor Medal by the Royal United Service Institute of India. This journey was the prelude to other journeys for which he became a Gold Medallist of the Royal Geographical Society and a Livingstone Gold Medallist of the Royal Scottish Geographical Society.

To-day, a generation later, the chief interest of Colonel Bailey's book lies in the proof it gives of what may be achieved by an expedition on an extremely modest scale. Judged by this or any other standard it is an admirable book: unpretentious, intimate, clear, and concise. Of criticism there is little to offer. At p. 9, line 23, the argument is upset by an obvious slip of the pen whereby the Dibong is confused with the Dihang. At p. 122, line 11, June 6 ought apparently to be July 6. It would have been easier to follow the journey if the map at the end of the book had been on a larger scale, and it is curious that in the inset map the course of the Tsangpo below a point a little to the south-east of Lhasa is not indicated.

An important issue is raised when the author says (p. 169), "I think it should be a rule that where a traveller has taken the trouble to get a place-name written down in the language of the country, no subsequent traveller should use a different spelling in English except in very exceptional circumstances." But there are obstacles to applying such an arbitrary rule as this. Place-names are not always uniformly pronounced or consistently spelt in Tibetan; transliteration of Tibetan script is not always reliable; and travellers of different nationality are liable to give different phonetic renderings of the same word. No more in the Tibet of to-day than in the India of a hundred years ago can it be claimed that the rendering of many place-names into Roman script has reached its final form. The wider application of phonetic training among travellers, and a study of the meanings of Tibetan place-names, should help in arriving at a satisfactory system of spelling.

The book contains hints that it may have a successor and that perhaps the author's travelling days are not yet over. In both cases it is to be hoped that the hint may be fulfilled. B. G.

NORTH AMERICA

LORD OF ALASKA: Baranov and the Russian adventure. By HECTOR Chevigny. *London: Robert Hale*, 1946. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 256 *pages; end-paper maps.* 12*s* 6*d*

As human drama Hector Chevigny's account of the life of Alexander Baranov is adventure at its highest; as a document of the history of Russian expansion into the American Continent and towards the Hawaiian islands it is important; as geography, or even as a contribution to the history of geography, it adds little to previous knowledge—nor was this the author's intention. Principally on account of the difficulty of translating Russian accounts and the obscurity to those outside the American Continent of such documents as United States Senate Reports, the monumental work of H. H. Bancroft has been hitherto almost the only source from which could be drawn authentic material on Alaska in the last quarter of the eighteenth and first quarter of the nineteenth centuries. The appearance therefore of a competent account compiled from new translations and collations of Russian sources is most welcome; none the less so for appearing in the form of a romantic biography.

'Lord of Alaska' tells the story of the Russian peasant who, to find fortune and

independence, travelled to the eastern limits of Siberia and eventually accepted the managership of one of the private companies trading for furs among the Aleutian Islands and eastwards into Alaska. Mr. Chevigny, dispelling the tradition of Baranov's violence and ruthlessness, reveals him as a man desirous of ruling by the law of right, but gradually compelled by the turn of events and the methods of his opponents to adopt a policy more violent than theirs. With the Indians of the Alaskan coast proper he was on good terms; but farther to the south-east, on the curious tongue of Alaskan territory which fringes the western boundary of British Columbia, the opposition of the natives was determined and cruel. His first settlement was destroyed and its inhabitants massacred and tortured. The arrival of the first warships of the Russian Imperial Navy enabled the final battle to be waged and won, and New Archangel to be founded in Sitka Sound. Everything was under the command of this extraordinary man: his personality supported the waverers as it defeated the traitors; his resource overcame the natural obstacles of his environment, as it poured roubles into the coffers of his employers.

Baranov's success so influenced the life of Rezanov, courtier, statesman, and envoy of the Tsar, that it was natural Mr. Chevigny should follow his biography of Rezanov with that of Baranov. In many respects they are complementary, one telling the story of Court intrigue in St. Petersburg, the other of struggles with primitive forces in a setting smiling and beautiful for four short months, pitiless for the greater part of the year.

The formidable list of "sources," mostly Russian, indicates the breadth of Mr. Chevigny's scholarship. A. H. C.

CENTRAL AMERICA

WEST INDIA ROYAL COMMISSION REPORT (Cmd. 6607). *London: H.M. Stationery Office*, 1945. 9½×6 *inches;* xviii+480 *pages; illustrations and folding map.* 7*s* 6*d*

There was considerable discontent in the West Indies in the 'thirties and serious riots took place in many of the islands. A comprehensive inquiry into the causes of these troubles became necessary, and in the summer of 1938 a Royal Commission was appointed, with Lord Moyne as chairman, "to investigate social and economic conditions" in the West Indies. The Commission worked so industriously that it produced a unanimous Report in December 1939. The recommendations of the Commission were published in February 1940 (Cmd. 6174), and the Government at the same time announced its acceptance of the most important of them—the establishment of an organization to promote West Indian development and welfare. The Report itself was not published in 1940, because it was regarded as certain that German propaganda would use this outspoken document for its own purposes, and it was not until June 1945 that this blue book of nearly five hundred pages was made available to the public. Two other documents were published at the same time as the Report (Cmd. 6607): these were a supplementary report (Cmd. 6608) on 'Agriculture, fisheries, forestry and veterinary matters,' by Professor F. L. Engledow, one of the Commissioners, and a 'Statement of action taken and the recommendations of the Commissioners' (Cmd. 6656). The latter document shows that the Government has carried into effect many of the recommendations of the Commission. For this reason, while the Report itself must be regarded as an historic State paper, it cannot be considered as a true picture of the existing state of affairs in the West Indies.

The Report was an attempt to describe conditions in the West Indies in 1938,

and it shows how the Commission was handicapped in all its work by the extraordinary lack of detailed and exact information concerning health, housing, and other social matters. There was a dearth of statistics of every kind, a dearth which is now being made good by the very elaborate censuses which are being held. Good maps were also wanting, and among the recommendations of the Commissioners was one to institute a topographical survey to settle questions of land ownership.

The Report is divided into five parts: a survey of the "general background" of conditions in the West Indies, a statement of the position and needs of the social services in 1938, a summary of the "problems of policy," a miscellaneous part called "other questions," which includes a valuable chapter on local and sectional interests which emphasizes the great differences between the islands, and finally a statement of "conclusions and recommendations." The Report is illustrated by sixteen plates of interesting photographs and by a very inadequate map of the Caribbean area on the scale of 1 : 3,500,000. Geographers who read the Report will find much to interest them, especially its treatment of agriculture and social life in the islands, but they will be disappointed by the method of presenting the material. For instance, even with the limited resources in statistics and maps available in 1939, it should have been possible to construct maps showing distribution of population in the islands, which would have illuminated the whole Report.

An examination of the Report makes it obvious that the decision to suspend publication until the war had ended was a very wise one. The Report showed the need for immediate reforming action, and it is the duty of every reader of the Report also to study the two reports by Sir Frank Stockdale (Col. 184 and Col. 189) which describe what has been actually achieved since 1938. It cannot be repeated too often that the Report of 1938 is now out of date in many respects and is a document of historic interest only, in so far as it is applied to the West Indies. Nevertheless the Report must be regarded also as a valuable summary of the problems of Colonial policy in general. E. W. G.

PACIFIC

FROM A SOUTH SEAS DIARY, 1938–42. By Sir HARRY LUKE. *London: Nicholson and Watson*, 1945. $4\frac{1}{2} \times 7\frac{1}{2}$ *inches; 256 pages; illustrations and end-paper maps. 12s 6d*

Sir Harry Luke was High Commissioner for the Western Pacific from 1938 to 1942. In that capacity, and as Governor and Commander-in-Chief of Fiji, he was in the area during one of the most critical periods in its history.

On matters of policy and strategy he has written elsewhere ('Britain and the South Seas,' London, 1945). In the present volume he gives us a picture of day-to-day life in the modern Western Pacific. It is written, very humanly and naturally, from the point of view of a British official visiting many new scenes in the course of his duties. The pages of his diary, from which the larger part of the book is taken *verbatim*, tell us little of the major problems with which Sir Harry was called upon to deal during this period, but they give us a most intimate picture of the setting of those problems. The very rapidity with which one passes on these pages from one island to another gives a vivid conception of the vast distances and the "variety in unity" of this Pacific World. We visit with the author all the island groups of the territory, and a large proportion of the islands within those groups, as well as the neighbouring territories of Eastern Samoa, New Caledonia, and the *Condominia* of the New Hebrides and the Phoenix Islands.

Besides describing native customs and ceremonies, the author reveals that he often took considerable trouble to visit many of the natural features of the islands. A not inconsiderable amount of physical exertion, not to say danger, must have been involved in many of the visits.

Some points of particular interest remain in one's mind after reading the book: descriptions of the model Fijian leper colony on the lovely island of Makongai; the habits of the *mbalalo*, an annelid worm whose movements are strangely related to long-period tidal phenomena, and of the coconut-eating crabs of Tonga; and the development of coral reefs and islands in all their stages.

The photographs are interesting, but it is unfortunate that some of them are none too clearly reproduced. Also one felt the lack of a second map on a larger scale than the end-paper sketch-map of the whole Pacific, which should at least name all the island groups referred to in the text. But these are minor criticisms of a very readable and informative book, which above all succeeds in conveying much of the human atmosphere of the British Pacific Dependencies.

F. H. W. G.

VOUZA AND THE SOLOMON ISLANDS. By HECTOR MACQUARRIE. *London: Victor Gollancz*, 1945. 8×5 *inches;* 142 *pages; illustrations and maps.* 9*s*

This book has been written with much verve and gusto by a man lately in the Colonial service, who evidently has the gift not only of imaginative sympathy with the native peoples with whom he had official contact, but also of conveying the reality of these very live relationships to outsiders with little knowledge of local conditions.

Mr. MacQuarrie is apparently suffering from a grievance against the pre-war administration, the importance of which to himself is much greater than it is to his public, and this often distorts and overbalances his otherwise clear and vivid prose. But the book is nevertheless a lively and diverting account of one man's personal relations with a group of Solomon Islanders, and in particular with one of these men, Vouza, of whom we are given a charming character study.

There is a simple end-map, far too often absent from books of this type and price, and some good photographs.

R. F.

PHYSICAL GEOGRAPHY

THE ELEMENTS RAGE. By FRANK W. LANE. *London: Country Life*, 1945. 9 × 5½ *inches;* xii + 128 *pages; illustrations.* 10*s* 6*d*

This is an interesting as well as an instructive book. The author has a talent for realistic description, and his accounts of earthquakes, volcanoes, hurricanes, and so forth, are enhanced by a number of exceptionally fine photographs. The book is, in fact, quite encyclopaedic in the recording of remarkable happenings from all over the world, and it is evident that the author has taken much trouble in the collecting of historical records.

In a work primarily designed to convey the might and grandeur of nature, it is perhaps too much to expect great accuracy in statement and in the quotation of figures which abound on every page. But an undoubted weakness is revealed in the treatment of scientific theory. As if aware of this, the author has taken the precaution, as acknowledged in the preface, of submitting each chapter to the scrutiny of an expert. Nevertheless it is not very satisfactory to find conflicting points of view set down side by side without any attempt at coordination. This defect is particularly noticeable in the otherwise excellent chapter on

lightning, which includes a good account of ball lightning. Thus, with reference to the pictorial patterns sometimes left on the bodies of people and animals killed by lightning, the author's statement that meteorologists consider the phenomenon to be the result of a branching electrical discharge passing through the tissues, having no correspondence with external objects, is quite reasonable in itself; but such a purely subjective explanation becomes absurd in the case cited of a boy on whose body was depicted the exact external environment. Yet the bewildered reader is left in this intellectual impasse without a word of guidance.

Some of the omissions are worth noting. In the chapter on meteors, descriptions are quoted of the extraordinary beauty of the great Leonid showers of 1833 and 1866, but no mention is made of the world-wide disappointment in 1899 when the swarm failed to reappear because, as it afterwards transpired, their course had been deflected by the pull of the planet Jupiter. In the chapter on snow, the author questions the veracity of a report of a 300 feet drift in the Tavy Cleave defile on Dartmoor in 1891. Yet the authority for such an occurrence does not rest on the word of a mere chance observer. In a paper on the latest summer snowspot on Carnedd Llewellyn in the Snowdon range (Brit. Rainfall (1909), pp. 46–53), the late Gethin Jones has shown that in a 2-foot snowfall a hollow 200 feet deep can be more than filled with fresh snow provided the drift-lines are suitably long and convergent. Hence there need be no theoretic difficulty about the great Dartmoor drift of 1891, when it is recalled that the blizzard of March 9–12 over south-west England was extremely severe, the general depth of snow over Devon and Cornwall being from 2 to 4 feet, swept by an easterly hurricane.

It is on the whole a very readable book, though not to be recommended to the uncritical reader. The forty-six plates, which include a frontispiece of the new Mexican volcano, Paricutín, are the work of various photographic experts.

L. C. W. B.

GEOCHRONOLOGIA SUECICA PRINCIPLES. By GERARD DE GEER. (K. Svenska Vetenskapsakademiens Handlingar 18.) *Stockholm: Almqvist and Wiksells*, 1940. 11 × 7½ *inches;* 368 *pages; atlas of folding maps*

Among his many activities as a geologist, Gerard De Geer was the founder of geochronology, or the recording of years in late-glacial time. He started in 1878, when impressed by the marked cyclical banding of glacial clays around Stockholm. It became evident that the clays represented deposition in standing water of glacial mud, comparatively abundant during spring and summer melting and reduced or almost absent in winter. Each pair of thick and thin layers, called a varve, therefore took one year to accumulate. In numerous sections De Geer found large numbers of annual bands one above the other, and he developed a technique for relating the sections with one another by identifying bands common to two or more sections. These in turn were related to terminal moraines and other glacial features, some occurring outside moraines, some within them. In this way the number of years during which the snouts of glaciers stood at known positions was assessed and the periods occupied by retreat and by stands at new positions were determined.

The work was carried from place to place and a great system was built up. The memoir gives a detailed account of the stages of the work, of the difficulties inherent in it (for example, the detection of reduplication produced by faults), and of the technique which De Geer and his helpers evolved.

Within Scandinavia the application of the methods and of geological inferences based on them are well understood, although, as might be supposed,

there are appreciable difficulties. At a fairly early stage however it was obvious that the technique might be applicable to other glaciated regions, and it has since been applied in many parts of the world, with similar results: it is perhaps at its best in middle and high latitudes, where the seasons of the year are fairly well marked and are likely to have been so in the past. Due consideration has been given however to inter-tropical regions which have two seasons of rainfall or snowfall per year.

The third stage is that of "teleconnection," that is, the relating of series of varves on a world-wide basis to produce a uniform time-rating. De Geer and his school became fully convinced of the authenticity of the teleconnections, and in general the principle is clear enough, but it must be obvious that the application is not so simple as the principle. Sceptics are inclined to think that there is room for series of varves to be incorrectly related, and for superficial similarities to be no more than coincidences on which undue reliance may be placed. De Geer, fully aware of such possibilities, devoted the utmost care to the problem, and his memoir shows that he was satisfied with the efficacy of the precautions and with the reliability of the essential common factor.

Those intimately connected with glacial geology are conscious of the problems, and De Geer's memoir is essential to their work; those who seek to learn and use so fascinating a time-scale must do so with care. Varves have been used to give precision to the end of the geological time-scale, but members of other arts and sciences would do well to remember that the surveillance they bestow on the applications of their own techniques is every whit as necessary in the use of varves.

The memoir is produced in conformity with the very high standard of the series in which it is published. It is profusely illustrated with plates, some of them coloured, and is accompanied by an atlas containing a large number of detailed maps. It takes its place as a standard work and is a fitting memorial to the character and personality of its author. K. S. S.

CARTOGRAPHY

AN INTRODUCTION TO CHARTS AND THEIR USE. By M. CHRISS and G. R. HAYES. *Glasgow: Brown, Son and Ferguson*, 1944. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 88 *pages; diagrams and specimen chart,* 5*s*

This is an excellent book describing the construction and use of navigational charts. It is not meant to be a text-book of navigation, but in showing how charts are used in plotting courses and positions, and reading buoys, lights, tides, and tidal streams, it is all that one would need in coastal waters and narrow seas. It is written by two members of the staff of the Hydrographic Department with the clarity and reliability one would expect in a chart, and is thoroughly recommended to all chart users. G. E. R. D.

HISTORICAL GEOGRAPHY

HENRY THE NAVIGATOR. By ELAINE SANCEAU. *London: Hutchison*, 1946. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 144 *pages; end-paper maps and frontispiece.* 16*s*

After her books on Afonso de Albuquerque and on the history of the Portuguese in Abyssinia, Miss Elaine Sanceau has now chosen a more stirring theme, on which she has already touched in the two earlier books. In fact it is practically impossible to deal with any main aspect of the Portuguese age of discoveries without referring to Prince Henry the Navigator. Though the author succeeds

in the popular and engaging manner in which she has treated the theme, it must not be forgotten that it has already been the subject of important works by several English scholars.

The two chief points to consider about Prince Henry are: what really was his part in the Portuguese discoveries and what was his character. Each of these points always has been, and is still, a matter of discussion. As regards the first, which is of more historical consequence, the question is why Henry sent his ships in quest of new lands and what he had in mind when doing so. Many have been of the opinion that the Prince was a "crusader," inspired above all by his religious zeal, and that from an early date he had conceived the plan of reaching India by sea; others, who have revised contemporary sources in a less romantic spirit, believe that the real motive behind Henry's undertakings and ventures was chiefly economic and political, in part a consequence of the social ferment and new situation created in Portugal, and the whole of Europe, at the end of the Middle Ages, and that the idea of reaching India may not have been considered until much later. For the latter, Prince Henry, though always imbued with religious fervour, was in his later years above all the administrator of an economic enterprise of national magnitude. The author tries to steer a middle course, though inclining to the former school of thought, and presents the Prince as a man with "the spirit of a crusader" and "that of a missionary as well," meditating shortly after the conquest of Ceuta in 1415: "Could not a western people allied to Prester John take up the challenge of Islam in the East? How were Christians to get back to the East again—to those enchanted lands described by Marco Polo?" However he "was a dreamer, but not a chaser of wild geese. He was a man of action." So the author imagines Prince Henry in his youth, cogitating on the geographical problems and then tracing a systematic plan of sending his ships to India round the south of Africa. "Henceforth the purpose of his life was fixed." One of the first practical results of Henry's enterprise was the rediscovery and colonization of Madeira and the Azores, which "was Europe's first serious colonial venture of modern times." It must be added that when Prince Henry was born in 1394, the Portuguese had been active at sea since the twelfth century; their ships sailed as far as the Levant, Normandy, and England, and they had established commercial factories in Bruges; in 1335 they had discovered the Canaries; in the last decades of the fourteenth century Lisbon had become the greatest port of call between the Mediterranean and Western Europe, thriving on shipping and merchandise of all sorts and origins. There was already a long maritime preparation which forms the background of the impulse given to Portuguese navigation in the fifteenth century. Even before the foundation of the University in the thirteenth century there was a Portuguese literature and intellectual as well as geographical curiosity, which has never ceased in Portugal from that time. The great merit of Prince Henry was to develop sea navigation in a scientific and systematical way, taking the first steps along the path that led to the creation of modern nautical science, and preparing the foundation on which was organized the master plan of the circumnavigation of Africa. The real organizer of that plan was King John II, his grand-nephew, born in 1455, five years before Prince Henry's death. He was to become the greatest figure in the whole of Portuguese history, yet the author practically ignores him.

In this country, interest in the six children of King John I of Portugal and the daughter of John of Gaunt, and in Prince Henry particularly, is mainly due not only to the important role played by the Navigator in the history of geography, but also to what Professor Carolina M. de Vasconcelos in 1891 called those "peculiar characteristics that the infusion of English blood impressed on

these Portuguese, which combine and mitigate with a tenacious idealism an honest integrity and a deep sentiment of moral dignity perfectly Germanic, an impetus, a pride and an ardour purely Peninsular." The author, and many others who have written before her, has a boundless admiration for Prince Henry. But many modern writers are not so enthusiastic about Henry's personal character. They see in that austere, misanthropic bachelor a cold-hearted man who selfishly let his own brothers, Ferdinand and Peter, die because that served his plans or convenience. After describing the death of Prince Peter in Alfarrobeira, the author writes: "The chronicler, Ruy the Pina, seems to think that he (Henry) had deserted his brother, and modern writers reproduce the charge. It is a tremendous accusation, and not one to be justly taken up to-day, unless new documents should come to light to prove or to disprove it." Indeed, some scholars are very severe, and one of them, Dr. J. T. Soares de Sousa, even wrote some seventy years ago that "Henry was the Cain in his family" (*Archivo dos Açores*, vol. IV). One of the more distinguished and unbiassed historians of to-day, Professor V. Magalhães Godinho, writes: "The role played by Prince Henry in the conflicts which preceded and followed the Regency of Prince Peter is very equivocal. Undoubtedly on the side of the nobility against the towns, he sought to consolidate his situation, presenting himself as an arbiter of the parties, obtained from his brother important concessions for the increase of his seigneurial house, and abandoned him in Alfarrobeira when the weight of an energetic intervention would very probably have saved him" ('Documentos sôbre a Expansão Portuguesa' (1945) vol. II, p. 168). In the reviewer's opinion this is a much more faithful picture.

The author has read a great deal of what has been written about Prince Henry in early chronicles and documents, as well as by modern writers. As she more than once says, "none of the conversations cited in my book are imaginary, but translated from the contemporary writers," which adds new charm to a delightful narrative. A few slips are however perhaps worth mentioning, such as the location of Cape Bojador 50 leagues south of the Canary Islands (p. 51), when in reality it is some 30 leagues only. Alvaro Fernandes did not reach "a latitude about ten degrees North" (p. 95); he went not much farther than Cabo dos Mastos (14° 38′ N.). "The University of Portugal founded at Coimbra by D. Denis, had subsequently been transferred to Lisbon, where it remained until the reign of D. João III" (p. 118); in fact the University was founded at Lisbon on 1 March 1290, transferred to Coimbra in 1308, reestablished in Lisbon in 1338, again transferred to Coimbra in 1354, once more reestablished in Lisbon in 1377, and finally settled in Coimbra in 1537. These however do not appreciably diminish the value of Miss Sanceau's book as an important contribution to the popularization of one of the greatest figures in the history of geography, which will be welcomed by British as well as Portuguese readers.

A. Z. C.

ADDITIONS TO THE LIBRARY

EUROPE

FORESTS AND FORESTRY IN GREAT BRITAIN

By W. L. Taylor. $8\frac{1}{2} \times 5\frac{1}{2}$, x+172 pp. Illustrations. *London: Crosby Lockwood*, 1946. 12*s* 6*d*

A general account of forestry in Britain, its value in the national economy, and its prospects by a member of the Forestry Commission

THE DISTRIBUTION OF THE ANGLES AND SAXONS ARCHAEOLOGICALLY CONSIDERED

By E. T. Leeds. (*Archaeologia*, 91 (1945) 1–106; maps and illustrations)

CZECHOSLOVAKIA. (*Citizens of the world series*)

By E. P. Young. $8\frac{1}{2} \times 5\frac{1}{2}$. 118 pp. Map. *London: St. Botolph Publ. Co.*, 1946. 3*s* 6*d*

ÉTUDE SUR LE DÉVELOPPEMENT DES VILLES ENTRE LOIRE ET RHIN AU MOYEN ÂGE

By F. L. Ganshof. $10\frac{1}{2} \times 6$. 78 pp. and 38 town plans. *Bruxelles: Librairie Encyclopédique*, 1943

CROSS-CHANNEL

By A. H. Brodrick. 9×6. 192+iv pp. Illustrations. *London: Hutchinson*, 1946. 21*s*

A personal commentary on modern France

LA COMMUNE RURALE FRANÇAISE

By A. Meynier. (*Ann. de Géogr.* 53–4 (1945) 161–79)

L'ÉVOLUTION MORPHOLOGIQUE DES COULÉES VOLCANIQUES EN AUVERGNE

By L. Gachon. (*Ann. de Géogr.* 53–4 (1945) 254–73)

LE VILLAGE ET LE PAYSAN DE FRANCE

By Albert Dauzat. (Coll. 'Le paysan la terre'). $9 \times 5\frac{1}{2}$. 220 pp. *Paris:* Gallimand, 1945. 55 *fr.*

A survey of rural life in its geogr. and hist. setting, with suggestions for combatting the flight from the countryside

RUSSIA'S FOREIGN TRADE AND THE BALTIC SEA

By H. E. Ronimois. 7×5. 52 pp. *London: Boreas Publ. Co.*, 1946

ASIA

A PILGRIM IN ARABIA

By H. St.J. Philby. $8\frac{1}{2} \times 5\frac{1}{2}$. 198 pp. Illustrations. *London: Robert Hale*, 1946. 16*s*

First published in a limited edition in 1943

MAN-EATERS OF KUMAON

By Jim Corbett. 8×5. xviii+212 pp. Illustrations. *London: Oxford Univ. Press*, 1946. 10*s* 6*d*

SOME SURVEYS OF RIVERS IN CEYLON

By H. A. S. Smith. (*Empire Survey Rev.* 8 (1946) 255–66)

KURIL'SKIE OSTROVA (The Kurile Ids.)

By A. Soloviev. (*Ac. Sci. U.S.S.R.*). $7\frac{1}{2} \times 5$. 196 pp. Maps. *Moscow*, 1945

Pt. 1 is a comprehensive description, including physical and economic geography. Pt. 2 is a detailed "pilot" for the islands

MALAYAN LANDSCAPE

By Katharine Sim. $8\frac{1}{2} \times 5\frac{1}{2}$. 248 pp. Illustrations. *London: M. Joseph*, 1946. 15*s*

SCIENCE AND SCIENTISTS IN THE NETHERLANDS INDIES

Ed. by P. Honig and F. Verdoorn. $10\frac{1}{2} \times 7$. xxii+492 pp. Maps and illustrations. *New York: Board for Netherlands Indies*, 1945

AFRICA

AFRICAN HANDBOOKS: 2. Mineral resources of Africa. By A. W. Postel. 106 pp. 3. The food resources. By T. S. Githens and C. E. Wood. 106 pp. $8\frac{1}{2} \times 5\frac{1}{2}$. Maps. *Philadelphia: Univ. of Pennsylvania Press*, 1943. 7*s* 6*d each*

ALONE-STOKES SHORT MANUAL OF THE AMHARIC LANGUAGE. 4th ed.

$6\frac{1}{2} \times 4$. 206 pp. *London: Macmillan*, 1946. 7*s* 6*d*

PROGRESS IN GEOLOGICAL INVESTIGATIONS AND MINERAL DEVELOPMENTS IN THE GOLD COAST

By N. R. Junner. (*Bull. Imperial Inst.* 44 (1946) 44–65)

METEOROLOGY OF NIGERIA AND ADJACENT TERRITORY

By R. A. Hamilton and J. W. Archbold. (*Quart. Journ. R. Meteorol. Soc.* 71 (1945) 231–64; diagrams)

THE ECOLOGY OF MAN AND PLANTS IN NORTHERN RHODESIA

By J. M. Winterbotham. (*Rhodes-Livingstone Journ.* No. 3 (1945) 33–44)

A GEOCHEMICAL SURVEY OF THE UNDERGROUND WATER SUPPLIES OF THE UNION OF SOUTH AFRICA WITH REFERENCE TO POWER PRODUCTION AND INDUSTRY

By G. W. Bond. (*S. Africa. Geol. Survey Mem.* 41 (1946) 208 pp.)

LAND USE IN THE OVER-POPULATED AREAS OF KABALE, KIGEZI DISTRICT, UGANDA

By J. W. Purseglove. (*E. African Agric. Journ.* 12 (1946) 3–10)

In some parts, the population density reaches 718 per square mile. About 20,000 people should be moved to fresh land

AMERICA

NORTH AMERICA; its people, and the resources . . . of the continent

By J. Russell Smith and M. O. Phillips. 9½×6½. xiv+1016 pp. Maps and illustrations. *New York: Harcourt, Brace* (1945). 30*s*

NORTH AMERICA: historical, economic, and regional geography

By Ll. R. Jones and P. W. Bryan. 7th ed. 9×5½. xvi+580 pp. Maps. *London: Methuen*, 1946. 14*s*

THE DISCOVERY OF CANADA

By L. J. Burpee. 8×5½. x+280 pp. Sketch-map. *Toronto and London: Macmillan*, 1944. 12*s* 6*d*

A simply written account for the general reader of the achievements of the explorers of Canada by a well-known authority. Short biographies and useful bibliographies in the appendices.

WINCHESTER-FAIRFIELD: proposed site for the permanent seat of the United Nations

By C. B. Hitchcock (*Geogr. Rev.* 36 (1946) 351–97; illustrations and maps)

A detailed geographical and social study of the proposed site, some 30 miles from the centre of New York City

WE LIVE IN ALASKA

By Constance Helmericks. 8×5½. 304 pp. Illustrations. *London: Hodder and Stoughton*, 1945. 12*s* 6*d*

THE BROADLEAF DECIDUOUS FORESTS OF THE PACIFIC NORTHWEST

By A. W. Küchler. (*Ann. Assoc. Amer. Geographers*, 36 (1946) 128–47)

An examination of the problem of the restricted extent of these forests in a favourable environment

SOUTH AMERICA; economic and regional geography.

By E. W. Shanahan. 6th ed. 8½×5½. xiv+318 pp. Maps. *London: Methuen*, 1944. 16*s*

HANDBOOK OF SOUTH AMERICAN INDIANS

Vol. 1. The marginal tribes. Vol. 2. The Andean civilizations

Ed. by J. H. Steward. (*Smithsonian Inst. Bureau of American Ethnology*, Bull. 143.) 9×6. Vol 1, xviii+624, vol. 2, xxxiv+1036. Maps and illustrations. *Washington*, 1946

"The Handbook centres attention on the culture of each tribe at the time of its first contact with Europeans." Later cultural changes are recorded where information is available. Two further volumes will complete this large co-operative work by anthropologists of N. and S. America

AUSTRALASIA AND PACIFIC

SOME ASPECTS OF THE TECTONICS OF AUSTRALIA

By E. S. Hills. (*J. & Proc. R. Soc. New South Wales*, 79 (1946) 67–91; diagrams)

ADVANCE AUSTRALIA—WHERE?

By Brian Penton. 7½×5. vi+234. *London: Cassell*, 1943. 5*s* 6*d*

POST-MIOCENE CLIMATIC AND GEOLOGIC HISTORY AND . . . MAJOR SOIL TYPES OF SOUTH AUSTRALIA

By R. L. Crocker. (*Australia; Council Sc. Research, Bull.* 193 (1946), pp. 56; map)

TARARUA STORY; published [for] the silver jubilee of the Tararua Tramping Club, 1919–44

Ed. by B. D. A. Greig. 9½×7. 108 pp. Illustrations. *Wellington, N.Z.*, 1946

Contains many illustrations of New Zealand mountain scenery

THE ISLANDS AND PEOPLES OF THE SOUTH SEAS AND THEIR CULTURES

By R. Kennedy. 10×6. 88 pp. Illustrations. *Philadelphia: Amer. Philosoph. Soc.*, 1945

ECONOMIC AND POLITICAL

LA FÉDÉRATION FRANÇAISE; contacts et civilisations d'outre-mer

By J. de la Roche and J. Gottmann. 8×5½. 642 pp. Illustrations. *Montréal: Editions de l'Arbre*, 1945

A comprehensive survey of French overseas territories, emphasizing their geographical and human diversities. After reviewing their political and social evolution, the authors examine, in the light of recent world trends, the bases of future colonial policy

BRITISH COMMONWEALTH OBJECTIVES

Ed. by Sir Harry Lindsay. 7½×5. 288 pp. *London: M. Joseph*, 1946. 10*s* 6*d*

IMPERIAL COMMONWEALTH

By Lord Elton. $8\frac{1}{2} \times 5\frac{1}{2}$. 544 pp. *London: Collins*, 1945. 21*s*

NATURAL PRINCIPLES OF LAND USE

By Edward H. Graham. $8\frac{1}{2} \times 5\frac{1}{2}$. xiv +274 pp. Illustrations. *New York: Oxford Univ. Press*, 1944. $3.50

THE RAW MATERIALS OF THE WORLD

By J. Gentili. $7\frac{1}{2} \times 4\frac{1}{2}$. 306 pp. Maps. *Melbourne: Whitcombe and Tombs* (1946). 8*s* 6*d*

GENERAL AND CARTOGRAPHY

GÉOGRAPHIE ZONALE: la zone tropicale

By Ernm. de Martonne. (*Ann. de Géogr.* 55 (1946) 1–18; illustrations and maps)

Prof. de Martonne discusses the climatic, structural, and orographic characteristics which differentiate the tropical from the other zones, as a problem in general geography, with a structural map of the world, scale 1/62·5M

THE PHOTOGRAPHY OF SCENERY

By Vaughan Cornish. $9 \times 5\frac{1}{2}$. 130 pp. Illustrations. *London: Sifton Praed*, 1946. 12*s* 6*d*

ORNAMENT, WRITING AND SYMBOLS ON MAPS, 1250–1800

By Edward Lynam. (Repr. from *Geogr. Mag.* 18 (1945) 323–6; illustrations). 2*s* 6*d*

A short summary for collectors of maps, relating the development of symbols and conventions to general scientific and social changes, with 34 illustrations, many in colour

BRIEF DESCRIPTION OF THE NATIONAL GRID AND REFERENCE SYSTEM. (*Ordnance Survey Booklet*, 1/45)

8×5. 12 pp. *London: H.M.S.O.*, 1946. 4*d*

MAPS

WORLD

World on Azimuthal Equidistant Projection showing the True Bearing and Distance from London of every position on the Globe. 1 : 63,360,000. London: Hydrographic Department, Admiralty, 1946

"OLYMPIC" AIR AGE WORLD MAP. Edited by Prof. E. G. R. Taylor and E. M. J. Campbell. 1 : 39,500,000. *London: R. Sculthorp* (1934), *Ltd.* (*Distribution:* George Philip and Son, Ltd.), 1946. 10*s* 6*d*

EUROPE

GREAT BRITAIN—ORDNANCE SURVEY. 1 : 25,000 or about $2\frac{1}{2}$ inches to 1 mile. Provisional Edition. 88 sheets.—One Inch Map, New Popular (Sixth) Edition, England and Wales 30 sheets.—Quarter Inch Map, England and Wales 8 sheets; Scotland 2 sheets.—Administrative Diagrams, England and Wales 1 : 126,720, 15 Counties. *Chessington: Ordnance Survey Office*, 1946

ASIA

INDIA. Map showing every town in which cotton mills are situated with the number of spindles and looms installed on 1 January 1946. 1 : 3,168,000. *Bombay: Indian Textile Engineers, Ltd.*

AFRICA

CROQUIS DE L'AFRIQUE FRANÇAISE, 1/M. Sheets: N.A–32, N.B–31, N.C–29, N.D–29, N.D–32, N.E–28, N.E–31, N.E–34, N.F–29, N.F–31, N.F–32, N.G–29, N.G–31. *Paris: Institut Géogr. Nat.*, 1941–45

AFRIQUE OCCIDENTALE ET CENTRALE. 1/5M. Carte de l'Élevage. Dressée par F. Bonnet-Dupeyron. No. 1, Éleveurs, Transhumance, Nomadisme. No. 2 and 3, Densité, Répartition du Cheptel. 4. Viande Consommable de la Population. 5, Commerce du Bétail. 6, Principales zônes et Regions d'Elevage. *Also* Densité de population. *Paris: Office de la Recherche Scientifique Coloniale*, 1945

ANGLO-EGYPTIAN SUDAN. 1 : 250,000. 74 sheets. *Khartoum: Sudan Survey Dept.*, 1939–45

CARTE INTERNAT. DU MONDE 1/M. Sheets: N.B–35 Wau; N.C–34 Qoz Dango; N.E–35 El 'Atrun. *Khartoum: Sudan Survey Dept.*, 1939–44

GAMBIA ROAD MAP. 1 : 500,000. Compiled and drawn by B. A. McArthur-Davis, Land Officer and Surveyor. *Bathurst*: 1945

CARTE ETHNIQUE DU GABON. 1/M. Dressée par Mlle. Thiery et M. Delarozière. *Paris: Office de la Recherche Scientifique Coloniale*, 1945

AMERICA

BRITISH COLUMBIA. Degree Sheet Series. 1 : 126,720. Map No. 4 B, Nelson. *Victoria: Dept. of Lands*, 1946

GEOLOGICAL MAP OF MANITOBA. Mineral Map of Manitoba 1 : 1,267,200. *Ottawa: Dept. of Mines and Resources*, 1946

CARTA AERONAUTICA DE LA REPUBLICA ARGENTINA. 1/M. Sheets: 7 Mendoza, 8 Buenos Aires, 11 Montevideo, 13 Neuquén, 14 Bahía Blanca. *Buenos Aires: Instituto Geogr. Militar*, 1946

THE MONTHLY RECORD

RESULTS OF THE QUESTIONNAIRE

It has now been possible to analyse the replies to the questionnaire on which Fellows were asked to state their preference on subjects for evening lectures, on the number of geographical films shown, and on the times at which lectures and films should be given. The main purpose of the questionnaire was to help in arriving at a programme of meetings which would be enjoyed by the majority of Fellows, but readers of the *Journal* may find the results interesting in themselves. The following is an analysis of the 1133 cards returned with preferences stated (points are allotted on a scale of 10 points for a first preference to 1 point for a tenth preference):

Subjects for Evening Lectures	*Number of points earned*	*Percentage of total points*
Exploration and travel	9774	16·92
Geography and international affairs	7071	12·24
Human geography	6410	11·10
History of exploration	5610	9·71
Geographical aspects of other sciences	5354	9·27
Physical geography	5337	9·24
Economic geography	5229	9·05
Historical geography and cartography	4496	7·78
Maps and survey	4427	7·66
Town and country planning	4057	7·02

Number of Geographical Films		*Percentages of total votes*	
To be increased		64·00	
unchanged		34·30	
decreased		1·70	
Times for Lectures and Films			
Afternoon Lectures	5.0 p.m.	41·00	
	5.30	59·00	
Evening Lectures	8.0	67·35	
	8.30	32·65	
Films	5.0	22·09	49·62
	5.30	27·53	
	8.0	31·71	50·38
	8.30	18·67	

A letter from Professor Walter Fitzgerald, arising out of the questionnaire, is published on p. 272-3.

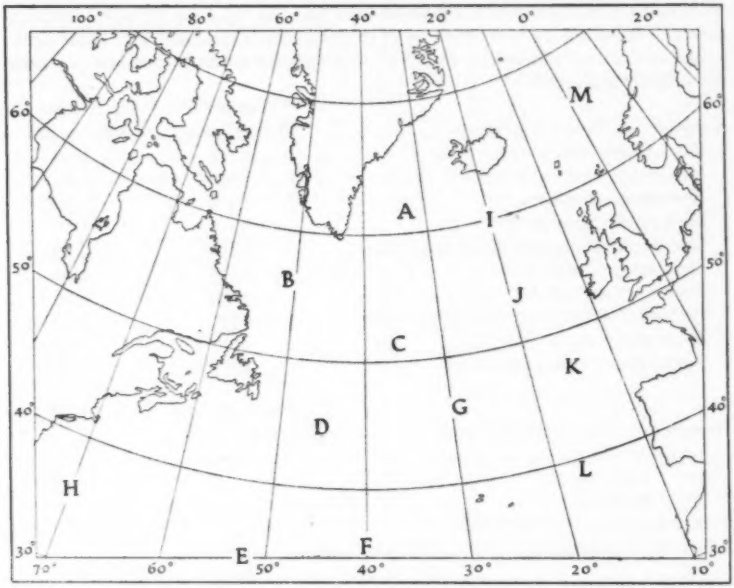
THE U.S.S.R. GEOGRAPHICAL SOCIETY

From Professor S. V. Kalesnik, Secretary of the U.S.S.R. Geographical Society in Leningrad, we have received a letter of warm appreciation for copies of the article "Geography in the Soviet Union," published in the *Journal* for November–December 1945 (vol. 106, pp. 217–21). The letter states that arrangements are being made to send us all publications of the Society and a copy of 'The U.S.S.R. Geographical Society, 1845–1945,' by Professor Leo Berg, the

President. This book, together with some copies of the Society's *Journal*, has now reached us and is in the Library; we hope soon to publish a review of it. The letter concludes, "In the name of our Society I thank you for the good wishes of the Royal Geographical Society, and I sincerely hope that we shall be able to re-establish close scientific relations. Best wishes to all in your Society from geographers here in the Soviet Union."

INTERNATIONAL CONFERENCES AT THE SOCIETY'S HOUSE

The Society has recently made its rooms available to two international conferences. The Conference on Ocean Weather Observation Stations in the North Atlantic, which opened on 17 September, met in London at the invitation of the



Position of new ocean weather stations in the North Atlantic

A 62° 00′ N. 33° 00′ W.	F 35° 30′ N. 40° 00′ W.	J 53° 50′ N. 18° 40′ W.
B 56° 30′ N. 51° 00′ W.	G 46° 00′ N. 29° 00′ W.	K 47° 00′ N. 15° 00′ W.
C 51° 45′ N. 35° 30′ W.	H 36° 00′ N. 70° 00′ W.	L 39° 00′ N. 17° 00′ W.
D 45° 00′ N. 45° 00′ W.	I 60° 00′ N. 20° 00′ W.	M 66° 00′ N. 12° 00′ E.
E 34° 00′ N. 52° 00′ W.		

Provisional Civil Aviation Organization. Under the Chairmanship of Sir Nelson Johnson, Director of the British Meteorological Office, the Conference prepared and opened for signature an International Agreement which provided for the operation of thirteen ocean weather stations, as recommended by the North Atlantic Air Navigation Meeting at Dublin in March 1946. Thirteen states of the North Atlantic region attended the Conference, of which nine—Belgium, Canada, France, Ireland, the Netherlands, Norway, Sweden, the United Kingdom, and the United States—are to participate directly in the operation or financing of the new stations. Denmark, Iceland, Portugal, and Spain also

attended the Conference and approved its decisions. It is hoped that the scheme will be in full operation by 1 July 1947.

The new stations will be special ships, manned and controlled by the Meteorological services of the participating nations. Surface meteorological observations will be made not less than eight times daily, upper air wind observations not less than four times daily, and upper air pressure, temperature, and humidity not less than twice daily. The upper air observations will be made by radio sonde balloons, the course of which will be traced by radar. The ships will also form part of the North Atlantic search and rescue organization, and will provide navigation aids, means of traffic control, and other services on the North Atlantic air routes. These ocean weather stations will not be the first of their kind. Similar stations did valuable work during the war, but their number has since been drastically reduced. The thirteen stations provided for under the new agreement were regarded by the Conference as an important contribution towards greater regularity and safety of the Atlantic air services. We hope to publish later a fuller account of the work of ocean weather stations by Mr. Edward Warner, President of the Council of the Provisional International Civil Aviation Organization.

Before the Conference closed, a resolution was passed expressing appreciation to the Society for its hospitality.

The International Conference on Tin, which opened on 8 October, met to review the world position of tin, and to consider what form of international cooperation will be needed when the existing International Tin Agreement expires at the end of this year. The governments of all the chief tin producing and consuming countries were represented at the Conference, which was attended by delegates from Belgium, Bolivia, China, France, the Netherlands, Siam, the United States, and the United Kingdom. The Chairman of the conference was Mr. F. Archer, of the Ministry of Supply, leader of the United Kingdom delegation. The Conference agreed that the world tin position should continue to be reviewed at frequent intervals by the countries concerned, and that the delegates should recommend to their Governments that an International Tin Study Group should be set up as soon as possible. The United Kingdom Government was invited to obtain from the other Governments represented their decisions on the proposed Tin Study Group by 1 January 1947, and to arrange for the first meeting of the Study Group as soon as possible thereafter. The Conference also recommended that the Combined Tin Committee in Washington should continue to allocate tin supplies while the period of shortage lasted, and that the continuation of the Tin Research Institute should be arranged by discussions between the interested countries.

NEW CHAIR OF PHOTOGRAMMETRY AT STOCKHOLM

Professor C. A. Hart, Professor of Surveying and Photogrammetry at London University, recently visited Stockholm at the invitation of the Royal University of Technology (Kungl Tekniska Högskolans) to advise on the first appointment to the new Chair of Photogrammetry, which had previously been combined with Geodesy in a single Chair. Professor Hart flew to Stockholm on October 2 to serve on an advisory committee, the other members being Professor Max Zeller, who holds the Chair of Photogrammetry at the Technical High School of Zurich, Lieut.-Colonel Löfström of the Finnish State Survey Department, and Professor Karl Rosén, late of the Swedish State Survey Department. The name of the candidate appointed to the new Chair is to be announced later.

APPOINTMENTS AND AWARDS

Dr. L. Dudley Stamp has been appointed Professor of Geography in the University of London at the London School of Economics, in succession to Professor Ll. Rodwell Jones. At the University College of Wales, Aberystwyth, Mr. E. G. Bowen succeeds Professor C. Daryll Forde in the Chair of Geography and Anthropology. Professor Forde is now Professor of Anthropology in the University of London and Director of the International African Institute. Lieut.-Colonel C. A. Hart has been appointed Professor of Surveying and Photogrammetry in the University of London.

The following awards have recently been announced by the Royal Scottish Geographical Society: the Society's Gold Medal to Professor H. J. Fleure, F.R.S., for his conspicuous work in geography; the Research Medal to Mr. Marcel Aurousseau, Secretary of the Permanent Committee on Geographical Names, for his valuable research upon the subject of nomenclature and on the transliteration of names; the Bruce Memorial Prize to Lieut.-Colonel P. D. Baird for his valuable survey and geological work in Greenland and the Canadian Arctic.

The Leverhulme Trustees have awarded Research Fellowships to Professor H. C. Darby for work on Domesday geography, and to Mr. F. Grave Morris for research into geographical conceptions in Western Europe of the earth's major surface features.

COLONIAL RESEARCH FELLOWSHIPS

The Secretary of State for the Colonies, on the advice of the Colonial Research Committee, has instituted a number of Colonial Research Fellowships to encourage qualified scientists to study Colonial problems and to enable them to pursue research work in the British Colonial Empire. Provision has been made for twenty-five such Fellowships within the period 1944–49, and it is hoped that the scheme will meet with sufficient interest to justify its becoming a permanency.

The Fellowships will be awarded by the Secretary of State on the advice of the Colonial Research Committee, and will normally be awarded to University graduates in the natural or social sciences under thirty-five years of age from any part of the British Commonwealth and Empire. Candidates must already have had experience of research work, and are required to submit a plan of research on a subject relevant to Colonial development which states clearly and concisely the nature of the problem which they wish to investigate. The Fellowships will be tenable for a period of two years, and may be extended for a third year; they carry remuneration at the rate of £400 per annum, which may be increased to a sum not exceeding £750 in certain cases; and they may be held in the British Colonial Empire only, not in the United Kingdom, the Dominions, or India. Further details about applications and terms of award may be obtained from the Secretary, Colonial Research Committee, Palace Chambers, Bridge Street, London, S.W.1.

FRENCH SCIENTIFIC OFFICE AND LIBRARY

A Scientific Office has recently been set up at the French Embassy to carry on and expand the work initiated during the past two years by the French Scientific Mission under the direction of Dr. Rapkine. It is hoped that it will play an active part in promoting close liaison between French and British scientists, for the exchange of information and for making personal contacts. A number of visits to this country by French scientists have already been arranged in collaboration with the Direction Générale des Relations Culturelles and the

Centre National de la Recherche Scientifique in Paris, and it is hoped to make similar arrangements for British scientists to visit France.

Part of the work of the Scientific Office is to encourage the exchange of French and British scientific literature, and for this purpose a small scientific library of French books has been opened at the Institut Français. The library contains a number of current scientific periodicals and a few recent French scientific books, which may be consulted at the library or borrowed by post. Arrangements have also been made to obtain from France any books or periodicals requested which are not available at the library. Fellows wishing to make use of these facilities are asked to write direct to the Librarian, Institut Français, Queensberry Place, South Kensington, London, S.W.7, stating that they are willing to be enrolled on the library register. They will then be sent a catalogue of the books and periodicals available.

EXERCISE MUSKOX

In the *Journal* for July–August 1945 we gave a summary of the plan for a joint Canadian Army and Air Force exercise which was to test equipment and examine travelling conditions in the Canadian Arctic in the late winter of this year. Exercise Muskox was carried out between February and May 1946, and at the first meeting in this session on October 28, Lieut.-Colonel Graham Rowley read a paper on the subject which we shall be publishing in the *Journal*. In the meanwhile Lieut.-Colonel Rowley sends us this short account of the exercise, which will be of especial interest to those who were unable to hear his paper.

During the war a considerable amount of research was carried out on arctic equipment. Canada took a leading part in this work and her immense northern territory was an ideal proving-ground. At the end of the war it was thought that much of the information gained might be of use in the development of north Canada and that some of the equipment could be adapted for civilian use in peace. It was therefore decided that the Canadian Army, with R.C.A.F. support, should carry out an exercise to show that winter travel by mechanical means in the Canadian Arctic had become a practical proposition through wartime improvements in equipment and technique.

The plan for Exercise Muskox was for a party of about fifty soldiers, scientists, and observers to travel in twelve tracked over-snow vehicles from Churchill in north Manitoba to the arctic coast of Canada and then to Edmonton. The route chosen was Churchill–Eskimo Point–Baker Lake–Perry River–Cambridge Bay–Coppermine–Port Radium–Norman–Simpson–Fort Nelson–Edmonton with a side-trip from Cambridge Bay across Victoria Island to Denmark Harbour and back, a total distance of 3130 miles. The party was to leave Churchill on February 14 and reach Edmonton on May 5 in order that both winter and spring "break-up" conditions should be experienced. The necessary fuel, food, and spare parts were to be delivered by the R.C.A.F. by parachute, glider, or landing along the route. In the planning stages it became apparent that to allow the R.C.A.F. to operate with reasonable safety it would be necessary to construct an airstrip and meteorological station at Baker Lake, and a separate force was formed to undertake this.

The Baker Lake Force consisted of eleven men carried in two of the "snow-mobiles," each with a tracked trailer, and two D-6 Caterpillar tractors fitted with angledozer blades and drawing in all four heavy freight sledges and a caboose. The force set out from Churchill on January 24 and followed the coast to Eskimo Point. They then cut inland direct to Baker Lake and, though delayed by a four-day gale with temperatures around −50° F., arrived ahead of schedule on February 17. Immediately after arrival a meteorological and signals

station was established and the tractors started clearing an airstrip on the ice surface of the lake, where the first Dakota aircraft touched down on February 20. The airstrip remained in service until the Moving Force had passed through and reached Cambridge Bay.

After a day's delay due to bad weather, the Moving Force left Churchill on February 15 in eleven snowmobiles, each dragging two light sledges. Most of the way to Baker Lake, which was reached on March 1, the tracks of the first party were followed, but bad weather caused slower going than had been anticipated. At Baker Lake the force was cut down to ten snowmobiles, as the vehicles were towing greater loads than they had been designed for, and fuel consumption was proving higher than expected. From Baker Lake the force went up the Thelon valley to Schultz Lake and then set a direct course for Perry River on the arctic coast. This was the most interesting stage of the journey as all the country was virtually unexplored. After some difficult days, Perry River was reached on March 13, and two good travelling days on the sea-ice of Queen Maud Gulf took them to Cambridge Bay. Most of the force halted here for seven days while three snowmobiles crossed Victoria Island to Denmark Harbour and back.

On March 23 the force set off again, over the sea-ice in Coronation Gulf, reaching Coppermine on March 27. The next stage was difficult going over high land to Dismal Lakes and down to Radium on Great Bear Lake. The force was now south of the tree line and, except on lakes, travel was restricted to tractor roads, some of which were badly overgrown. From Radium to Norman there were no difficulties, but after leaving Norman on April 14 the effects of the unusually early spring began to be felt. Soft snow and breaking rivers caused delays which could only be countered by almost continuous travelling which the long spring days made possible. On May 1 however, only four days later than originally planned, the force left Fort Nelson with a clear run ahead on the Alaska Highway. Over half the remaining distance to Edmonton was covered in four days, but an unexpected mechanical difficulty then arose. Fine grit from the dusty surface of the highway made its way into the engines and caused breakdowns. By then however the object of the operation had been successfully accomplished, and to save the expense of engine replacements the party loaded their machines on to a train at Grand Prairie and completed the journey to Edmonton by rail.

Exercise Muskox undoubtedly showed that mechanized travel in the Canadian Arctic is now practicable. The fact that it was completed as planned, though no comparable journey had ever been carried out, justified the faith the Canadian authorities placed in their new equipment. The part played by the R.C.A.F. in providing supplies of all types, entailing long flights over unmapped country and in all kinds of weather, requires special emphasis; without it the journey would have been quite impossible as the snowmobiles have a limited range. In addition to the experience gained of mechanical travel in arctic and sub-arctic regions, the opportunity was used to test arctic equipment of many types, and the scientists of the party acquired valuable data for future research in meteorology, magnetism, zoology, navigation, and geology.

THE UNDERGROUND STRUCTURE OF BRITAIN

During the war the very large number of borings which were undertaken in the search for oil resulted in an immense amount of new knowledge concerning the underground structure of south-east Britain. The geological results have been given in detail by Dr. G. M. Lees and Mr. A. H. Taitt in the *Quarterly Journal of the Geological Society*, 101 (1945), 255–317, while Dr. Lees has sum-

marized the main results in the 1946 Abbott Memorial Lecture, published as a brochure by University College, Nottingham.

The borings in search of oil were carried out in five separate geological provinces: in the Midland Valley of Scotland, in the Permian of north Yorkshire, in Lancashire, in the Carboniferous rocks of the Eastern Midlands, and over a wide area in southern England. A small oilfield was proved at Formby in Lancashire, the oil occurring in the Keuper waterstones and the Keuper sandstones within 200 or 300 feet of the surface. Its discovery is particularly interesting for two reasons. In the first place, seepages have been known at least since they were described by Camden in his 'Britannia' (1637), and were described in some detail as long ago as 1843. In the second place, the origin of the oil is unknown, and deep borings carried down to over 6000 feet have yielded interesting geological information but have failed to discover any deep-seated source of oil.

Economically the important discoveries were of oil in several anticlines in the Millstone Grit, where the Paleozoic rocks are covered by Triassic beds, to the north-east of Nottingham. The most productive field is that of Eakring, which yielded a quarter-of-a-million tons of oil up to the end of 1944, oil having been struck first in June 1939. Less productive, but still important, is the small oilfield at Kelham Hills. Despite the early discoveries in the use of natural gas at Heathfield in the Wealden anticlinal area, the numerous borings made in the Weald and other anticlinal structures in southern England have not proved productive, but the borings have yielded geological information of far-reaching interest and importance.

The structure of the Paleozoic platform underlying the younger rocks of south-east England is important because of the possibility of new coalfields. The East Kent Coalfield, proved towards the end of the last century, is not the only example of a completely hidden field. A completely new field has been discovered north, east, and south-east of Lincoln, the southern limit of which is not yet known. The steadily accumulating evidence of underground structure points also to the possibility of new and hitherto unknown coalfields in the area between Bath, Gloucester, Oxford, and Reading, as well as more speculative prospects towards the Essex coast.

Another important discovery was that of potash salts of Permian age at Eskdale in north Yorkshire. These salt deposits are of the same general character as those which have been of such enormous economic importance in north-west Germany. Although it is not yet known whether they can be exploited commercially, important possibilities have been opened up. In general the results of the borings made during the war emphasize the need for much further exploration of the same sort before it can be said that the mineral resources, even of such a well-known and well-explored country as Britain, are fully known.

L. D. S.

LIST OF FELLOWS

A List of Fellows, corrected to 30 September 1946, is now in the press, and will be ready in November. Copies may be obtained from the office of the Society by Fellows only, price Five Shillings.

In preparing this list, it was found that the Society had lost touch with a number of Fellows whose names appear on p. viii of this *Journal*. The Director would be glad if Fellows who have information which might enable contact with them to be resumed would communicate with the Office.

CORRESPONDENCE

GEOGRAPHY AND ITS COMPONENTS

May I add my appreciation to that of other Fellows for the opportunity to recommend for evening lectures those aspects of Geography which are of special interest to us? The categories included in the Questionnaire provide a comprehensive range, the grouping of subjects being one upon which I should like to comment. My suggestions are not to be regarded as criticism of the Questionnaire, which, I think, will serve admirably the purpose it was designed to fulfil. They are intended rather for the academic body of British Geography, which has not yet cleared away the vagueness and ambiguity from which our terminology has long suffered. Moreover, acceptable definitions of certain parts of Geography are still required, though they are not likely to be achieved until geographical terminology has been revised. I believe that many of my colleagues will support me in the following views; on the other hand, dissent would be welcome as leading to discussion and clarification of the obscurities I have in mind.

The separation of Economic Geography from Human Geography in the Questionnaire follows an unfortunate common practice. I have before me the prospectus of one of our University Departments of Geography in which the two are treated separately, indeed in isolation from each other. By now, should it not be established beyond argument that Human Geography embraces Economic Geography as also its other constituents—Social Geography and Political Geography? It will be recalled that, in the 1880's and later, all humanistic aspects of Geography were labelled "Political Geography" to distinguish them from Physical Geography, so that Economic Geography was then regarded as part of Political Geography (see, for example, J. Geikie, "Geography and Geology," *Scot. Geogr. Mag.* 3 (1887) 129–35). At that time the influence of the French school of *Géographie humaine* had not extended across the Channel, and the inadequate, if not illiterate, rendering of that term into English had still to come.

As regards the scope and content of Economic Geography there is fortunately little or no disagreement in this country. Moreover, the proportion of their attention which British geographers have devoted to it has certainly not been inadequate. On the other hand there is vagueness and comparative neglect for the equally important subject of Social Geography, witnessed by the absence of adequate reference to it in the pages of the *Journal* and elsewhere in English geographical literature. Apart from Professor P. M. Roxby's appeal on its behalf in his Presidential Address to Section E of the British Association in 1930, I am acquainted with no published attempt on the part of a British geographer to define Social Geography prior to 1945, when the paper by E. W. Gilbert and R. W. Steel on "Social geography and its place in colonial studies" was published in the *Journal* (106 (1945) 118–31), and my own paper "The Geographer as Humanist" appeared in *Nature* (156 (1945) 355-7). It was not surprising to me therefore to discover no reference to it in the Questionnaire, and it is one of the purposes of this letter to plead for fuller recognition by geographers of its importance.

Some geographers there are who, disliking and distrusting the term "Human Geography" confine their attention and their terminology to "Economic" and "Political Geography." At least I can sympathize with their hostility to a title which we would do well to abandon, despite the wide currency it has gained. To use it habitually in our nomenclature is to court merited criticism not only from philologists but also from those scientists in neighbouring fields to our own who watch cautiously, but often with sympathy, the efforts of geographers to establish their subject as a disciplined system of thought. I admit that "Humane

Geography" is ambiguous and would hardly serve, though our colleagues in Arts who refer to "the humane studies" without embarrassment would understand us better than they do now if we employed this term. "Anthropogeography" is the alternative employed by some geographers who dislike "Human Geography"; but it is clumsy and also subject to ambiguity, as some students understand by it what others call "Racial Geography." If it were possible to replan our nomenclature *ab initio* I feel certain that I should recommend replacing "Human Geography" by "Social Geography" as not only philologically sound but also the most suitable *omnibus* term for all our humanistic studies.

In the Questionnaire the reference to "Historical Geography and Cartography" inevitably raises the point whether the association of these two subjects was accidental or whether "Historical Cartography" rather than "Cartography" was in mind. This seems possible, as "Maps and Survey" are listed separately. I mention this because Historical Geography, as I understand the term, is very different from the History of Geography which some geographers hold it to be; and the latter definition would most easily suit association with Historical Cartography. Many, if not a majority, of geographers recognize Historical Geography to be the geography, both physical and humanistic, of past times. In practice however it must be ruefully admitted that much of the Historical Geography recently written is merely Economic History with geographical trimmings. Obviously there is urgent need for geographers to reach general agreement in their definition of Historical Geography, as Mr. E. W. Gilbert, in his paper "What is Historical Geography?" (*Scot. Geogr. Mag.* 48 (1932) 129–35) suggested some years ago.

WALTER FITZGERALD.

10 *September* 1946.

By the term "Historical Geography" we meant Historical Geography as defined by Professor Fitzgerald. In associating it with Cartography, we intended the adjective "Historical" to apply to both Geography and Cartography, the study of the geography and of the maps of past times seeming to us to be an appropriate association. We hope that Professor Fitzgerald's attempt to clarify geographical terminology will raise further correspondence.—Ed. *G.J.*

A CORRECTION TO ARCTIC HISTORY

In his presidential address delivered before the Royal Geographical Society on 26 May 1851 (*J.R.G.S.* 21 (1851) lvi–cii) Captain (afterwards Admiral) William Henry Smyth stated that Captain Sir George Back was appointed to the *Terror* "on her expedition to the Polar regions in search of Sir John Ross; . . ." He had confused Back's maritime expedition of 1836–37, which had no such object, with his Arctic land expedition of 1833–35, which had. Bencker has made the same mistake in the *Hydrographic Review* (21 (1944) 155).

While checking Smyth's mistake, it became evident that subsequent writers have confused Lieutenant (afterwards Rear-Admiral) William Smyth, who accompanied Back on the *Terror*, with the Admiral William Henry Smyth, who was President of the Society from 1849 to 1851. In Sir Clement Markham's 'The Arctic Navy List' (London, 1875), the particulars given under the heading "Smyth, William H." apply not to Admiral William Henry Smyth but to Rear-Admiral William Smyth. Laird Clowes too, in his history 'The British Navy' (vol. vi, London, 1901), although careful to distinguish W. H. Smyth as "Mediterranean Smyth" and to spell the name correctly in his text, listed the two in his index as "Smyth, Capt. William Henry" and "Smythe, Capt. William." His references under the latter name to pages 519 and 523 apply not to William Smyth but to William Henry Smyth.

Laird Clowes was also mistaken in describing Lieut. William Smyth as "the

future explorer of the Amazons" when he joined the *Terror*. Smyth's journey from Lima to Para was made between 20 September 1834 and 29 May 1835, and the account of it was published in 1836, the year in which the *Terror* sailed for the Arctic.

M. AUROUSSEAU.

4 *September* 1946.

MEETINGS: SESSION 1945–46

Twenty-third Meeting, 13 May 1946. Mr. J. A. Steers in the Chair

Paper: The determination of the gradients of enemy-held beaches. By Mr. W. Williams

Twenty-fourth Meeting, 20 May 1946. Mr. Leonard Brooks, Vice-President, in the Chair

Geographical Film: Kashmir and Baltistan. Geographical films with commentary by Major J. Waller

Twenty-fifth Meeting, 27 May 1946. The President in the Chair

Elections: Herbert Basil Abraham; Captain Henry Samuel Allan, R.D., R.N.R.; Tukaran Bhaurao Awale, M.A., BT.; Laurence Beswick; Offord Buxton; Mrs. Editha Carbery; Lieut.-Colonel J. R. Carmichael Christopher, D.S.O.; Lieut. Edward Henry Dorrell, R.N.V.R.; Captain Robert Charles Evans, R.A.M.C.; Ian Fleming; Commander D. H. Fryer, R.N.; Miss Marjorie Evelyn Goudie, B.A.; Colonel C. A. Hart, R.E.; Brigadier M. Hotine, R.E.; Gordon James Husted, B.A.; Commander Thomas Lowden Lace, R.N.V.R.; Bruce Philip Lambert; Duncan Hugh McPherson; Captain A. P. Millman, R.E.; Major Eric d'Eresby Moss; Miss Gladys Helen Must; Lieut.-Colonel Thomas Henry Fancourt Nevins; Mrs. Dorothy Ormsby; Carl Pape; Miss Ann Parry; Albert Matheson Quennell, M.SC., A.M.I.C.E.; Kirkpatrick Graham Randell; Major Reginald John Redman, M.B.E.; Miss Judith Rook; Mrs. Margaret Sedgwick Rough; Mrs. Graham Rowley; Anthony Bodley Scott; Air Chief Marshal Sir John C. Slessor, K.C.B., D.S.O., M.C.; Graham Sutton Smith; Mrs. Joan Lendon Smith; Lieut. Edgar David Stogdon, R.N.V.R.; John Arthur Thornton; Patrick Miles Ulyatt; Captain Gordon Thomas Warwick, M.B.E., B.SC.; Frederick Wheeler

Paper: Geographical influences in American history. By Professor Dexter Perkins

Twenty-sixth Meeting, 17 June 1946. The President in the Chair

Elections: Captain Colin Blaine Campbell, R.E.; Alfred George Cox; Stuart Cruickshank; Miss Eileen M. Dawkins, B.SC.; Parameshwar Dayal; Mrs. Ella Grainger; George Sydney Harrison; John Berridge Kay, B.SC.; P./O. John Douglas King, R.A.F.; Lady Lees; Miss Joscelyn Mona Lindup; Major Rupert Mackay MacDonald, R.A.; Dr. Mohammed Saleh Makiya, B.ARCH., PH.D.; Captain Dillwyn Miles; Merlin Theodore Minshall; Wilfred George Moore; J. Bernard Morgan; Christian Arthur Edgar O'Brien, B.A.; Charles Howard Pickthorn; John Ackland Richards; The Rev. Cyril Singleton; Walter Marshall Spooner, B.SC.; Norman Leslie Stribley; Alexander Stuart, M.A., ED.B.; Walter Leonard Thackrah; David Thomas; Mrs. M. Joan Thompson; Conrad Joseph Thoren, A.B., S.M.; Flight-Lieut. John Julian Walters, R.A.F.; Meurig Mon Williams; Miss Lucia Mary Windsor, M.A.

Paper: The geographical aspects of British agriculture during the war years. By Professor L. Dudley Stamp

Annual General Meeting, 24 June 1946. A report on the Annual General Meeting was published in the March–April *Journal* (107 (1946) 173–6)

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